



# **216 Port InfiniBand FDR Switch Platform Hardware User Manual**

PN: SX6512-4R

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FDR InfiniBand Switch System User Manual

# Table of Contents

<b>Table of Contents</b>	<b>3</b>
<b>List of Figures</b>	<b>5</b>
<b>List of Tables</b>	<b>7</b>
<b>Revision History</b>	<b>8</b>
<b>About this Manual</b>	<b>9</b>
Intended Audience	9
Related Documentation	9
Conventions	10
<b>Chapter 1 Overview</b>	<b>11</b>
1.1 Product Information	11
1.1.1 Serial Number and Product Version Information	11
1.1.2 Management Module MAC	12
1.1.3 Product Physical Specifications and Power	12
1.2 Features List	14
<b>Chapter 2 FDR</b>	<b>15</b>
<b>Chapter 3 Hardware</b>	<b>16</b>
3.1 LED Status Indicators	20
3.1.1 Power Supply Unit LEDs	20
3.1.2 Leaf Board LED Indicators	22
3.1.3 Spine Board LED Indicators	23
3.1.4 Spine Side Panel Display LED Indicators	26
3.1.5 Management Module LED Indicators	27
3.1.6 Port Connector Interfaces	28
3.2 Air Flow	28
3.3 QSFP Cable Power Budget Classification	28
3.4 Management Module Interfaces	29
3.4.1 I2C	29
3.4.2 CONSOLE	29
3.4.3 MGT– Management	29
3.4.4 USB	30
3.4.5 Reset – RST	30
<b>Chapter 4 Installation</b>	<b>31</b>
4.1 Environmental and Safety Recommendations	31
4.2 Chassis Package Contents	32
4.3 Leaf Package Contents	33
4.4 Spine Package Contents	33
4.5 Management Package Contents	33
4.6 Physical Installation	33
4.6.1 6518ESD Connection	34
4.6.2 Installation Procedure	34
4.6.3 Installing the Cable Holder	40
4.6.4 Installing the Chassis	43
4.6.5 Ground Connections	48
4.7 Power Connections	49
4.7.1 Powering Up the Switch Platform	49
4.8 InfiniBand QSFP Cable Installation	51
4.8.1 Cable Power Classes	52

<b>Chapter 5</b>	<b>Chassis Power Up</b>	<b>53</b>
5.1	Power Supply and Spine Board Indicator Status at Power ON	53
<b>Chapter 6</b>	<b>Insertion and/or Hotswap Extraction</b>	<b>55</b>
6.1	Power Supply Units	55
6.1.1	Extracting and Inserting the Power Supply Unit	55
6.2	Leaf Boards	57
6.2.1	Extracting a Leaf Board	58
6.2.2	Inserting a Leaf Board	59
6.3	Spine Boards	59
6.3.1	Extracting a Spine Board	59
6.3.2	Inserting a Spine Board	60
6.4	Fan Modules	60
6.4.1	Leaf Fan Module	61
6.4.2	Spine Fan Modules	62
6.5	Management Module	63
6.5.1	Extracting a Management Module	63
6.5.2	Inserting a Management Module	64
6.6	Switch Shut Down Procedures	65
6.6.1	To shut down the chassis run the following command twice (once for each MM):	65
6.6.2	To shut down a leaf run the following command:	65
6.6.3	To shut down a spine run the following command:	65
<b>Chapter 7</b>	<b>Disassembly and Disposal</b>	<b>66</b>
7.1	Disassembling the Chassis	66
7.1.1	Removing the Chassis	66
7.1.2	Removing the Bottom Shelf	67
7.2	Disposal	67
<b>Chapter 8</b>	<b>Switch Management Tools</b>	<b>68</b>
8.1	InfiniBand Subnet Manager	69
8.2	Fabric Diagnostics with UFM Diag	69
8.3	Accessing the CPU via the Ethernet Connector	69
8.4	Upgrading Software	70
<b>Chapter 9</b>	<b>TroubleShooting</b>	<b>71</b>
9.1	Power Supply Unit	71
9.2	Leaf Board	71
9.3	Management Module	72
9.3.1	Yellow Status LED (for the Chassis) on the Management Module is Lit	72
9.3.2	Yellow LED for the Leaf Fan on the Management Module is Lit	72
9.3.3	Yellow LED for the Spine Fan on the Management Module is Lit	72
9.4	Spine Board	73
9.5	MLNX-OSSW	73
<b>Appendix A</b>	<b>Specification Data</b>	<b>75</b>
A.1	Specifications	75
A.2	EMC Certifications	77
<b>Appendix B</b>	<b>Calculating the Weight of a Customized Chassis</b>	<b>78</b>
<b>Appendix C</b>	<b>Calculating the Power of a Customized Chassis</b>	<b>79</b>
<b>Appendix D</b>	<b>QSFP Interface</b>	<b>80</b>
<b>Appendix E</b>	<b>Replacement Parts Ordering Numbers</b>	<b>82</b>
<b>Appendix F</b>	<b>Avertissements de sécurité d'installation (French)</b>	<b>84</b>
<b>Appendix G</b>	<b>Installation - Sicherheitshinweise (German)</b>	<b>87</b>
<b>Appendix H</b>	<b>Advertencias de seguridad para la instalación (Spanish)</b>	<b>90</b>

## List of Figures

Figure 1	Generic Product Label	11
Figure 2	Management Module MAC Address Location	12
Figure 3	SX6512 Switch Views	13
Figure 4	Power Supply Unit Status Indications	20
Figure 5	PSU Cover On and Off	21
Figure 6	Leaf Board Led Indicators	22
Figure 7	Spine Status LEDs	24
Figure 8	Spine Side Panel Display Status Indications	26
Figure 9	Management Module Status Indications	27
Figure 10	Port Numbering	28
Figure 11	Top and Bottom Ports	28
Figure 12	Management Module Interfaces	29
Figure 13	Reset Button	30
Figure 14	Shelf Installation Kit Parts	36
Figure 15	Inserting the Caged Nuts for the Shelf	38
Figure 16	Use These Holes for the Rail Slides	38
Figure 17	Connect Rail Slide to Rack Vertical support	39
Figure 18	Inserting the Caged Nuts for the Faceplate	39
Figure 19	Cable Holders	40
Figure 20	Inserting the Caged Nuts for the Cable Holder	41
Figure 21	Cable Holder Placement	42
Figure 22	Chassis Rails and Rail Slides	43
Figure 23	Screw the Handles Onto the Chassis	44
Figure 24	The Rails are Already Connected Onto the Chassis	44
Figure 25	Using a Mechanical Lift	45
Figure 26	Put on the Rail Slide	46
Figure 27	SX6512 Chassis on the Shelf	47
Figure 28	Face Plate Mounting Bolt Locations	47
Figure 29	Move the Rail Slide to the Vertical Support	48
Figure 30	Ground Connection	49
Figure 31	Multiple Power Inlets - Electric Caution Notification	50
Figure 32	Spine Module	51
Figure 33	Spine Side Panel Display Status Indications	54
Figure 34	Management Module Status Indications for Normal Operation	54
Figure 35	Power Cord Bar	56
Figure 36	PSU Locations	56
Figure 37	Power Supply	57
Figure 38	Leaf Board Numbering	58
Figure 39	Ejector Latch	58
Figure 40	Leaf Release	59
Figure 41	Ejector Latch	60
Figure 42	Spine Board Extraction	60

Figure 43	Fan Locations on the Chassis	61
Figure 44	Leaf Fan Module Extraction	61
Figure 45	Spine Fan Module	62
Figure 46	Fan Status LED on the Spine Module	62
Figure 47	Ejector Latch	64
Figure 48	Management Module	64
Figure 49	QSFP Connector Male and Female Views	81

## List of Tables

Table 1:	Revision History of this User's Manual	8
Table 2:	Reference Documents and Web Sites	9
Table 3:	Switch Rack Mechanical and Environmental Requirements (Fully Populated Chassis)	12
Table 4:	Leaf Status LED	22
Table 5:	Bad Port LED Configurations	22
Table 6:	Connector Physical and Logical Link Indications	23
Table 7:	Spine Status LED	24
Table 8:	Spine to Leaf IB Link Status	24
Table 9:	Spine Fan Status LED	25
Table 10:	Spine to Leaf IB Connection Status LEDs	25
Table 11:	Bad Port LED Configurations	25
Table 12:	LEDs Display for Normal Operation	26
Table 13:	LEDs Display for Normal Operation	27
Table 14:	Switch Specification Sheet SX6512	75
Table 15:	Power Consumption of Chassis Parts	79
Table 16:	InfiniBand QSFP Connector Pinout	80
Table 17:	Replacement Parts Ordering Numbers	82

# Revision History

**Table 1 - Revision History of this User's Manual**

Revision	Date	Details
0.1	May, 2011	First Draft

## About this Manual

This manual provides an overview of the SX65126518 modular InfiniBand chassis switch and guidelines for its operation.

### Intended Audience

This manual is intended for users and system administrators responsible for installing and setting up the chassis platform.

The manual assumes familiarity with the InfiniBand<sup>®</sup> architecture specification.

### Related Documentation

The documentation set accompanying the QSFP Chassis InfiniBand Switch platform includes the following:

**Table 2 - Reference Documents and Web Sites**

<i>Mellanox OFED Stack for Linux User's Manual</i>	See <a href="http://www.mellanox.com">http://www.mellanox.com</a> > Support > InfiniBand Software and Drivers Click "Mellanox OpenFabrics Enterprise Distribution for Linux (MLNX_OFED)" Select the Linux User's Manual The embedded OS and tools on the CPU in the management module is a subset of the Mellanox OFED stack.
<i>Switch Hardware Installation Guide</i>	Each Mellanox Technologies' switch platform is shipped with an <i>Installation Guide</i> document that contains instructions for installation in a rack and initialization of the switch platform.
<i>IB Switch Platforms Embedded Management Tools Document no. 2141UM</i>	Describes the Embedded Management Tools (EMGT) package, which provides Out-of-Band management capabilities for InfiniBand switches. Available from <a href="http://docs.mellanox.com">http://docs.mellanox.com</a> (requires a Mellanox Technologies customer account).
<i>Switch Firmware and Firmware Update Tools</i>	See <a href="http://www.mellanox.com/content/pages.php?pg=management_tools&amp;menu_section=34">http://www.mellanox.com/content/pages.php?pg=management_tools&amp;menu_section=34</a>  Note that the Switch System described in this manual is based on Mellanox Technologies' SwitchX switch device.
<i>Unified Fabric Manager™ (UFM™)</i>	The user manual can be downloaded together with the software package upon license purchase

## Conventions

Throughout this manual, the name SX6512 and the term switch are used to describe the 216 port QSFP InfiniBand chassis, unless explicitly indicated otherwise.

The following pictures are used throughout this document to indicate information that is important to the user.



This symbol makes recommendations to the user.



This symbol indicates information that is helpful to the user.



This symbol indicates a situation that can potentially cause damage to hardware or software.



**BEWARE!** This symbol indicates a situation that can potentially cause personal injury or damage to hardware or software.

# 1 Overview

This User Manual provides an overview of the SX6512 QSFP Modular InfiniBand Switch Platform (known in this document as ‘the switch’) and its operational environment.

Mellanox switch system provides the highest performing fabric solution by delivering high bandwidth and low latency to Enterprise Data Centers (EDC), High-Performance Computing (HPC) and Embedded environments. Networks built with the SX6512 system can carry converged traffic with the combination of assured bandwidth and granular quality of service. Built with Mellanox’s 5<sup>th</sup> generation (1<sup>st</sup> generation SwitchX VPI) switch device, SX6512 systems provide up to 56Gb/s full bidirectional bandwidth per port. With up to 216 ports in a 10U high form factor, these systems are among the densest switching systems available.

The switch platform comes pre-installed with all necessary firmware for standard operation within an InfiniBand fabric and requires an InfiniBand compliant Subnet Manager running from one of the hosts or the management module of the switch system. An initial configuration procedure should be followed to initialize the switch before connecting it to the network after which normal operation can proceed. (See the installation guide for details regarding the initial configuration) Once connected to the network, the Subnet Management software automatically discovers and configures the fabric and begins utilizing the switch.

The Mellanox Operating System (MLNX-OS™) software package provides a subnet manager and network management tools as well as connectivity software for servers and storage, and is available on the Mellanox web site.

Basic installation is covered in **Chapter 4, “Installation” on page 31.**

Hot-swapping components and hardware maintenance is covered in **Chapter 6, “Insertion and/or Hotswap Extraction” on page 55.**

## 1.1 Product Information

### 1.1.1 Serial Number and Product Version Information

The serial number, GUID Identifier and product version information are found on the label that is attached to the pull-out tab that is below the Mellanox logo on the spine side of the chassis.

**Figure 1: Generic Product Label**

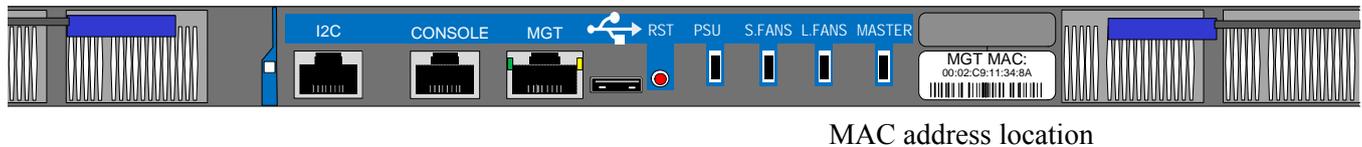


This is the System Image GUID according to the IB spec. It is burned on the board which is in the chassis. All the boards and the management SW look for this GUID in addition to their own Node GUID.

### 1.1.2 Management Module MAC

Each management module has a label with its MAC address. See below for the location of this label.

**Figure 2: Management Module MAC Address Location**



MAC address location

### 1.1.3 Product Physical Specifications and Power

**Table 3 - Switch Rack Mechanical and Environmental Requirements (Fully Populated Chassis)**

Rack Height Required	Rack Width	Rack Depth	# of leafs / # of Spines	Weight	Max. Power (216 x QSFP Ports)	Ambient Temp.
10 U (444mm) including bottom shelf	19" (EIA-310) (482.6 mm)	25.7" 685 mm	12/6	120 kg (265 lbs) full configuration 48 kg ( 105 lbs) empty configuration	Typical: 2553.59W (including QSFP at 2W) Typical: 2337.59W (including QSFP at 1W) Max: 2815.11W (including QSFP at 2W) Up to 4 Power Supplies of 100-240VAC, 50-60Hz, 6.3-13A	Max: 45°C Min: 10°C

The switch ships in a minimum base configuration plus additional modules depending on the chosen customer configuration. Optional modules include:

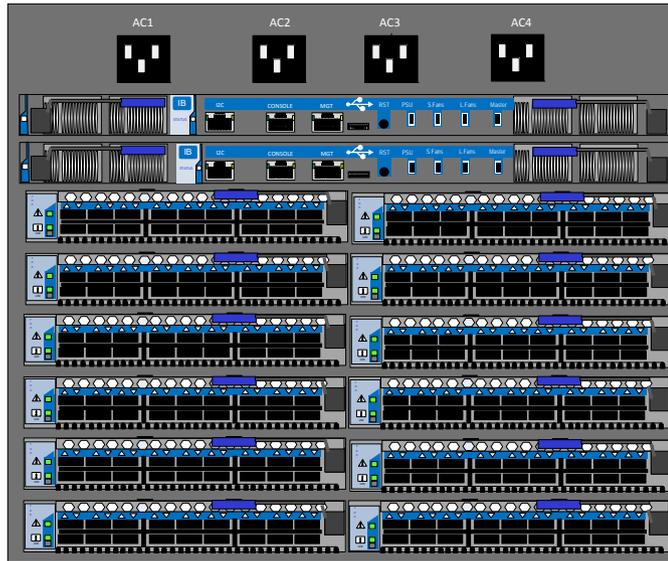
- Leaf boards
- Management modules
- Spine boards

Figure 3 shows the connector and spine sides fully populated.

**Figure 3: SX6512 Switch Views**

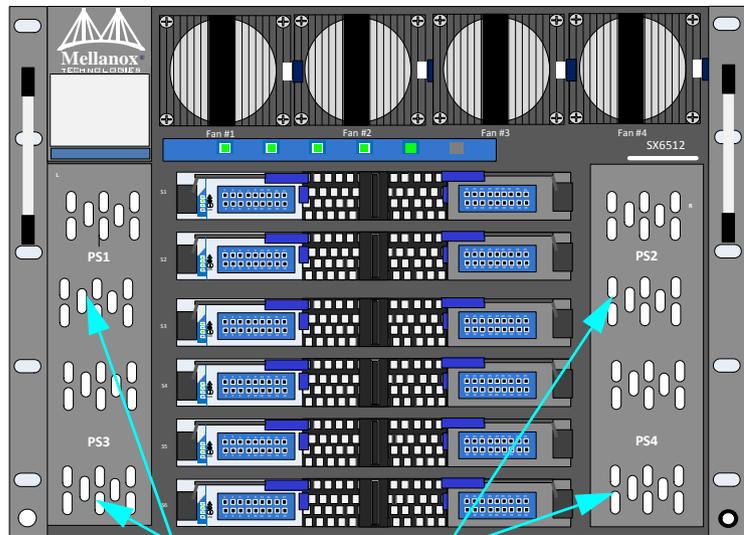
Two management modules

12 leaf boards



Four leaf fan modules

6 spine modules



4 Power Supply Units

## 1.2 Features List

- 216 FDR (56Gb/s) ports in a 10U switch
- IBTA 1.3 and 1.21 compliant
- SDR/DDR/QDR/FDR10/FDR link speed
- Congestion control
- Adaptive routing
- Port mirroring
- FDR10 supports 20% more bandwidth over regular QDR using the same cables/connectors.\*\*
- Chassis High Availability
- sMB High Availability

## 2 FDR

The Mellanox SX65126518 switch system supports FDR, a pre-standard InfiniBand data rate, where each lane of a 4X port runs a bit rate of 14.0625Gb/s with a 64b/66b encoding, resulting in an effective bandwidth of 54.54Gb/s. The FDR physical layer is an IBTA specified physical layer using different block types, deskew mechanism and framing rules.

The SX65126518 switch also supports FDR10, a non-standard InfiniBand data rate, where each lane of a 4X port runs a bit rate of 10.3125Gb/s with a 64b/66b encoding, resulting in an effective bandwidth of 40Gb/s.

FDR10 supports 20% more bandwidth over regular QDR using the same QSFP cables/connectors.

Both FDR and FDR10 support Forward Error Correction (FEC), as described in IEEE 802.3ap chapter 74.



FDR and FDR10 are only guaranteed to work with approved Mellanox Cables.



FDR10 is only guaranteed to work with approved Mellanox ConnectX-3 adapters.

## 3 Hardware

### Installation Safety Warnings

#### 1. Installation Instructions

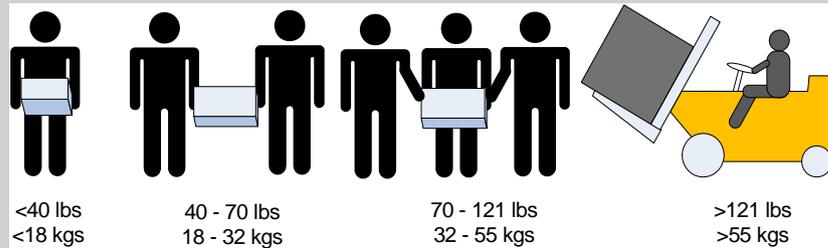


Read all installation instructions before connecting the equipment to the power source.

#### 2. Bodily Injury Due to Weight



Use enough people to safely lift this product.



#### 3. Installation in Restricted Access Location.



This unit is intended for installation in Restricted Access Location.

#### 4. Over-temperature



This equipment should not be operated in an area with an ambient temperature exceeding the maximum recommended: 45°C (113°F). Moreover, to guarantee proper air flow, allow at least 8cm (3 inches) of clearance around the ventilation openings.

#### 5. Stacking the Chassis



The chassis should not be stacked on any other equipment. If the chassis falls, it can cause bodily injury and equipment damage.

#### 6. Redundant Power Supply Connection - Electrical Hazard



This product includes a redundant power or a blank in its place. In case of a blank power supply, do not operate the product with the blank cover removed or not securely fastened.

#### 7. During Lightning - Electrical Hazard



During periods of lightning activity, do not work on the equipment or connect or disconnect cables.

## 8. Copper InfiniBand Cable Connecting/Disconnecting



Copper InfiniBand cables are heavy and not flexible, as such they should be carefully attached to or detached from the connectors. Refer to the cable manufacturer for special warnings/instructions.

## 9. Rack Mounting and Servicing



When this product is mounted or serviced in a rack, special precautions must be taken to ensure that the system remains stable. In general you should fill the rack with equipment starting from the bottom to the top.

## 10. Equipment Installation



This equipment should be installed, replaced, and/or serviced only by trained and qualified personnel.

## 11. Proper Enclosure



A suitable electrical, mechanical and fire enclosure shall be provided by the end product manufacturer and or the end user.

## 12. Equipment Disposal



Disposal of this equipment should be in accordance to all national laws and regulations.

## 13. Local and National Electrical Codes



This equipment should be installed in compliance with local and national electrical codes.

## 14. UL Listed and CSA Certified Power Supply Cord Leakage >3.5mA



For North American power connection, select a power supply cord that is UL Listed and CSA Certified, 3 - conductor, [16 AWG], terminated with a molded plug rated at 125 V, [13 A], with a minimum length of 1.5m [six feet] but no longer than 4.5m.

For European connection, select a power supply cord that is internationally harmonized and marked “<HAR>”, 3 - conductor, minimum 1.0 mm<sup>2</sup> wire, rated at 300 V, with a PVC insulated jacket. The cord must have a molded plug rated at 250 V, 10 A.



**Warning:** High leakage current; Earth connection essential before connecting supply.

### 15. Add GND connection information



Before connecting this device to the power line, the protective earth terminal screws of this device must be connected to the protective earth in the building installation.

(GND Connection Information):

The building installation shall provide a means for a connection to protective earth; and the equipment shall be permanently connected to that by a service person.

A SERVICE PERSON shall check whether or not the socket - outlet from which the equipment is to be powered provides a connection to the building protective earth. If not, the SERVICE PERSON shall arrange for the installation of a PROTECTIVE EARTHING CONDUCTOR from the separate protective earthing terminal to the protective earth wire in the building. The equipment shall be installed in area where equipotential bonding exists ((such as a telecommunication centre or a dedicated computer room).

### 16. Installation codes



This device must be installed according to the latest version of the country national electrical codes. For North America, equipment must be installed in accordance to the applicable requirements in the US National Electrical Code and the Canadian Electrical Code.

### 17. Interconnection of units



Cables for connecting to the unit RS232 and Ethernet Interfaces must be UL certified type DP-1 or DP-2. (Note- when residing in non LPS circuit)

Overcurrent Protection: A readily accessible Listed branch circuit overcurrent protective device rated 20 A must be incorporated in the building wiring.

### 18. Hazardous Radiation Exposure



Caution – Use of controls or adjustment or performance of procedures other than those specified herein may result in hazardous radiation exposure.



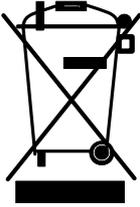
CLASS 1 LASER PRODUCT and reference to the most recent laser standards: IEC 60825-1:2007/03 and EN 60825-1:2007

### 19. Do Not Use the Switch as a Shelf or Work Space.



Caution: Slide/rail mounted equipment is not to be used as a shelf or a work space.

## 20. WEEE Directive



According to the WEEE Directive 2002/96/EC, all waste electrical and electronic equipment (EEE) should be collected separately and not disposed of with regular household waste.

Dispose of this product and all of its parts in a responsible and environmentally friendly way.

## 3.1 LED Status Indicators

The LEDs are placed on the chassis for the convenience of the IT manager.

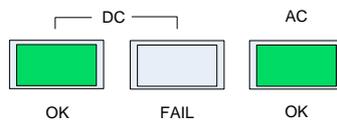


We recommend that all of the chassis sub systems be maintained and managed through the management software.

### 3.1.1 Power Supply Unit LEDs

Each Power Supply Unit has the following indicator LEDs.

**Figure 4: Power Supply Unit Status Indications**



AC – When lit this LED indicates input voltage between 100 and 240 Volts.

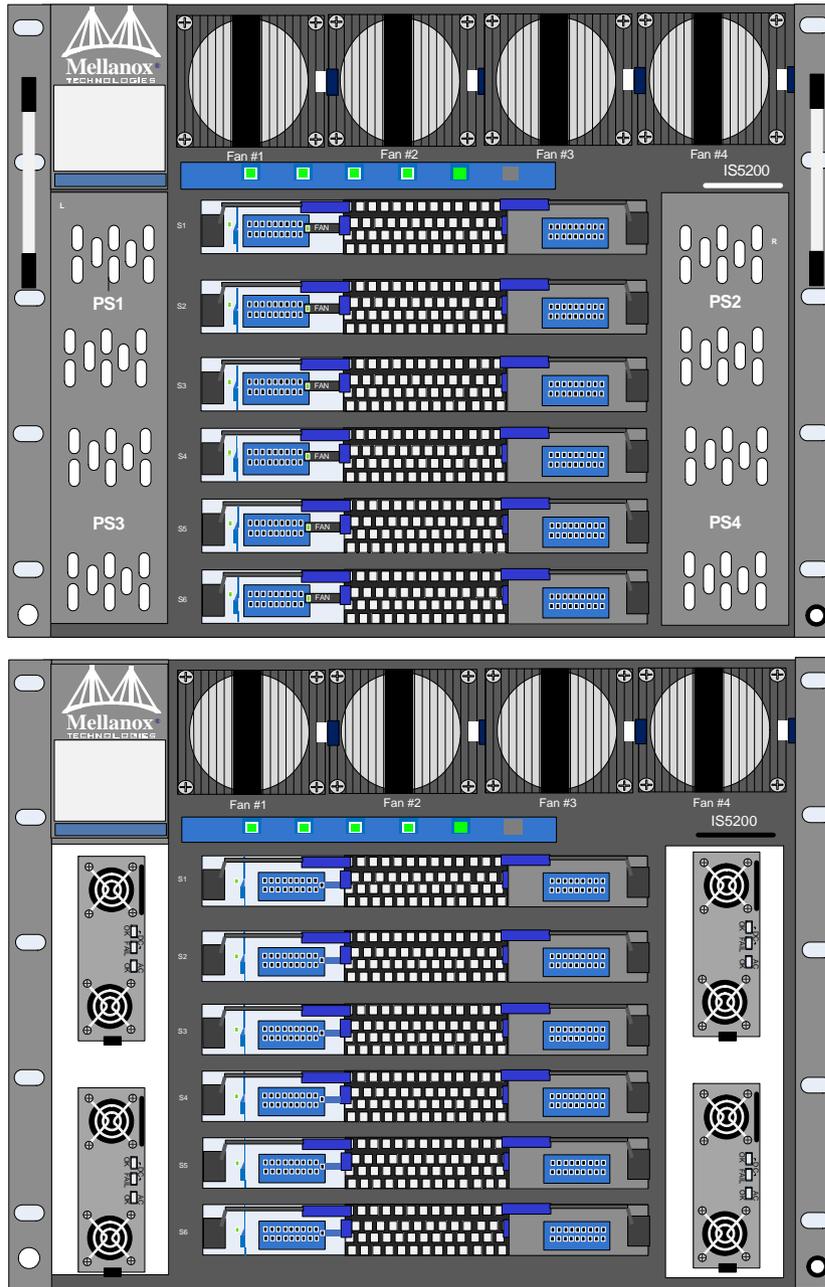
DC FAIL – When lit this LED indicates a fault in the power supply.

DC OK – When lit this LED indicates that the output from the power supply is +48 VDC.



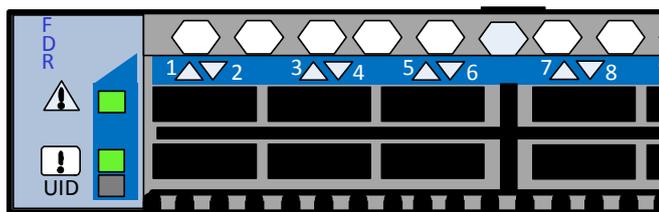
The PSUs are on the spine side of the chassis behind two cover panels. The plugs for these PSUs are on the leaf side of the chassis.

**Figure 5: PSU Cover On and Off**



### 3.1.2 Leaf Board LED Indicators

**Figure 6: Leaf Board Led Indicators**



#### 3.1.2.1 Status LED

Each leaf board has a Status LED on the far left of the leaf. This LED has the following meanings according to the LED status.

The Leaf Status indicator LED  has the following led assignment:

**Table 4 - Leaf Status LED**

LED Status	Description
Off	No power to the Leaf
Solid Green	Leaf is up and running
Flashing Green	Leaf is powering up
Orange	Non fatal error This color LED needs troubleshooting, but does not require chassis shutdown.
Red	Fatal error

#### 3.1.2.2 Bad Port LED

The Bad Port indicator is located on the left side of the leaf. The following Bad Port conditions are possible:

**Table 5 - Bad Port LED Configurations**

LED Status	Description
Off	OK – All ports are up and running.
Flashing Orange	Error –One or possibly more ports has just received a symbol error.

This LED shows symbol errors. Possible causes for this are:

- bad cable
- bad connection

- bad connector

This LED lights up when one or more ports is receiving a symbol error. The LED immediately goes off until the next symbol error is received.

### 3.1.2.3 UID LED Switch Identifier

The UID LED is a debug feature that will become available to customers in the near future. For details please contact Mellanox Technologies support.

### 3.1.2.4 Leaf Board Port Connector LED Assignment

Above the ports are two LEDs one for the upper port ▲ and one for the lower port ▼. The following table shows the port status according to the LED indication.

**Table 6 - Connector Physical and Logical Link Indications**

LED Status	Description
Off	No power to the port
Solid Green	Logical link up
Flashing Green	Data activity flashing speed $\approx$ data transfer speed
Orange	Physical link up
Flashing Orange	A problem with the physical link



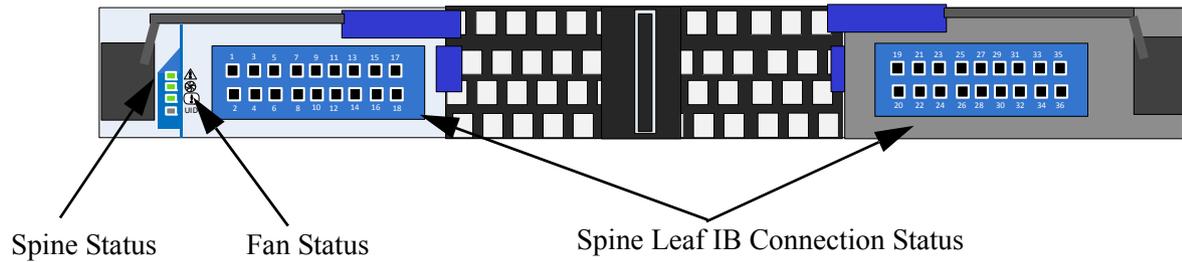
The switch does not provide a visual means that indicates the port speed configuration (SDR, DDR, QDR, or FDR) and/or the link width (1X or 4X). The speed and link width configurations can be retrieved using management software.

### 3.1.3 Spine Board LED Indicators

Each leaf board is connected by links to each spine module. Each spine has one status LED for the spine and 36 status LEDs. The 36 LEDs on each spine are divided by the number of leafs and the result (X) is the number of ports from each leaf that are connected to the spine. spines must be installed and working to ensure that full BW exists between nodes. Should a leaf be removed then X number of LEDs will turn off on each of the spines.

Along with the status LED there is a Fan LED, a Bad Port LED, and a UID LED.

The status LEDs for the spine and their descriptions are shown in Table 7. The LEDs indicate as follows.

**Figure 7: Spine Status LEDs**

### 3.1.3.1 Status LED

The Spine Status indicator LED  has the following led assignment:

**Table 7 - Spine Status LED**

LED Status	Description
Off	No power to the spine
Solid Green	Spine is up and running
Flashing Green	Spine is powering up
Orange	Non fatal error
Red	Fatal error

The leaf board status on each spine displays the condition of the connection between the spine and each leaf. There is a minimum of one LED per each leaf per each spine. Each spine has leaf status LEDs. The leaf LEDs on each spine indicate as follows:

The Spine to leaf board Status indicator LED has the following led assignment:

**Table 8 - Spine to Leaf IB Link Status**

LED Status	Description
Off	Link is down
Solid Green	Logical connection
Flashing Green	Data activity
Orange	Physical connection

### 3.1.3.2 Fan LED

The Spine Fan indicator LED  has the following led assignment:

**Table 9 - Spine Fan Status LED**

LED Status	Description
Green	Spine Fan is OK
Yellow	One or more of the fans in this spine is not working Each spine has two fans in the fan module.

### 3.1.3.3 Spine to Leaf IB Connection Status LEDs

These LEDs indicate a valid connection between a leaf and a spine.

The Spine to Leaf IB Connection Status LEDs have the following led assignment:

**Table 10 - Spine to Leaf IB Connection Status LEDs**

LED Status	Description
Green	A valid connection exists between this spine and the numbered leaf.
Yellow	A valid connection <b>does not</b> exist between this spine and the numbered leaf.

### 3.1.3.4 Bad Port LED

The Bad Port indicator is located on the left side of the spine. The following Bad Port conditions are possible:

**Table 11 - Bad Port LED Configurations**

LED Status	Description
Off	OK – All ports are up and running.
Flashing Orange	Error –One or possibly more ports has just received a symbol error.

This LED shows symbol errors. Possible causes for this are:

- bad cable
- bad connection
- bad connector

This LED lights up when one or more ports is receiving a symbol error. The LED immediately goes off until the next symbol error is received.

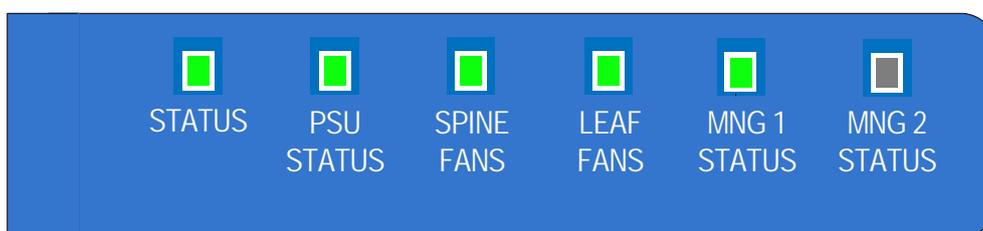
### 3.1.3.5 UID LED Switch Identifier

The UID LED is a debug feature that will become available to customers in the near future. For details please contact Mellanox Technologies support.

### 3.1.4 Spine Side Panel Display LED Indicators

The spine side panel display has LEDs that show the chassis condition.

**Figure 8: Spine Side Panel Display Status Indications**



**Table 12 - LEDs Display for Normal Operation**

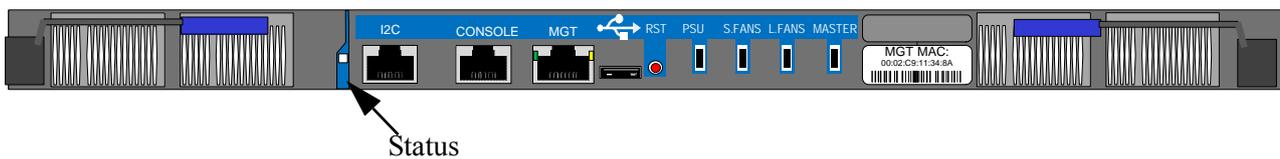
LED	Status and Description	Normal State
STATUS	Off = No Power Green = System is up and running. Yellow = System warning. Attention needed (such as overheating). Red = System not operational (Diagnostics fail, CPU hang, HW fail, Overheat-critical) Blinking Yellow = System booting / Restore factory defaults in progress.	Green
PSU STATUS	Off = No power Green = Normal operational Red = PS fault detected. User should check individual power supplies for fault indications.	Green
SPINE FANS STATUS	Off = No power to fan Green = Nominal operational Red = Fatal failure Turn the chassis off and then troubleshoot	Green
LEAF FANS STATUS	Off = No power to fan Green = Nominal operational Red = Fatal failure Turn the chassis off and then troubleshoot	Green

**Table 12 - LEDs Display for Normal Operation**

LED	Status and Description	Normal State
MGT 1 STATUS	Off = no power or this management module is not installed Green = Management module is operating as a master Yellow = Management module is operating as a slave (i.e., the other management module is a master)	Green
MGT 2 STATUS	Off = no power or this management module is not installed Green = Management module is operating as a master Yellow = Management module is operating as a slave (i.e., the other management module is a master)	Yellow

### 3.1.5 Management Module LED Indicators

**Figure 9: Management Module Status Indications**



The management module LEDs display the switch system operating conditions.

**Table 13 - LEDs Display for Normal Operation**

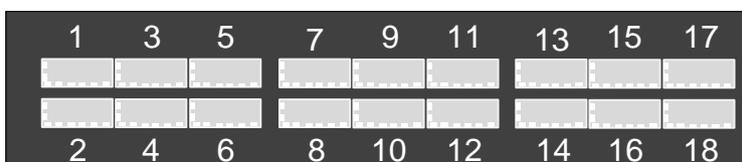
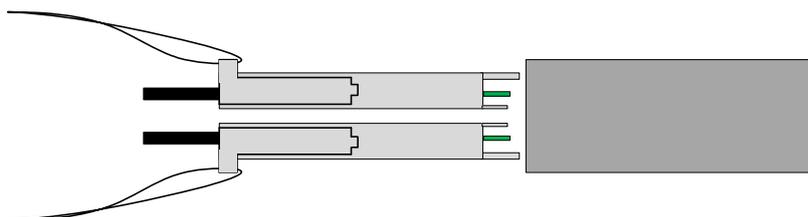
LED	Status and Description	Normal State
STATUS This LED shows the status of the chassis.	Off = No Power Green = System is up and running. Yellow = System warning. Attention needed (such as overheating). Red = System not operational (Diagnostics fail, CPU hang, HW fail, Overheat-critical) Blinking Yellow = System booting / Restore factory defaults in progress.	Green
PSU STATUS	Off = No power Green = Normal operational Red = PS fault detected. User should check individual power supplies for fault indications.	Green
SPINE FANS STATUS	Off = No power to fan Green = Nominal operational Yellow = Non fatal failure 1 or more of the spine fan modules has failed Red = Fatal failure Turn the chassis off and then troubleshoot	Green

**Table 13 - LEDs Display for Normal Operation**

LED	Status and Description	Normal State
LEAF FANS STATUS	Off = No power to fan Green = Nominal operational Yellow = Non fatal failure 1 or more of the leaf fan modules has failed Red = Fatal failure Turn the chassis off and then troubleshoot	Green
MASTER	Off = no power or this management module is not installed Green = Management module is operating as a master (i.e., the other management module is a slave) Yellow = Management module is operating as a slave (i.e., the other management module is a master)	Green

### 3.1.6 Port Connector Interfaces

The connector side of the switch has 12 leaf boards and each leaf board has 18 QSFP ports. The ports on each leaf board are placed in two rows, 9 ports to a row. The ports are labelled as shown in Figure 10. The bottom row ports are flipped from the top row. See Figure 11.

**Figure 10: Port Numbering****Figure 11: Top and Bottom Ports**

## 3.2 Air Flow

These switches come with the air flow pattern of air entering through the spine side and exiting through the connector side.

## 3.3 QSFP Cable Power Budget Classification

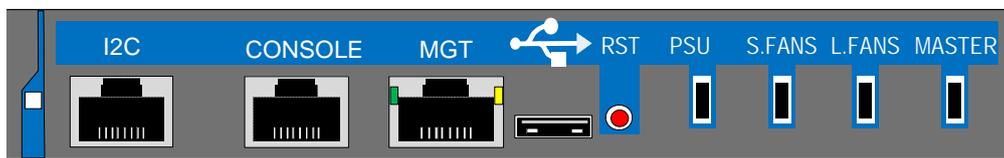
All SX6512 QSFP switches are designed for active cables with a max power per module of 2.0W. This is power level 2 according to the QSFP Public Specification.

## 3.4 Management Module Interfaces

The switch system requires at least one management module. The management module has five interfaces to connect to the SX6512. They are:

- 1 I2C port
- 1 CONSOLE port – this is an RS232 connector for connecting to a host machine
- 1 MGT – this is an Ethernet connector
- 1 USB port
- 1 RST – reset button

**Figure 12: Management Module Interfaces**



### 3.4.1 I2C

**This interface is for Debug and Troubleshooting only.** This interface is for FAEs only.

### 3.4.2 CONSOLE

The CONSOLE port is used during the installation process to configure the chassis for remote management. Connect this port to a local host using the harness supplied with the chassis. See the Installation Guide for the initial configuration procedure.

### 3.4.3 MGT– Management

The MGT port is an Ethernet port for remote management. Any remote terminal connected to the Ethernet can then be used to manage the fabric and chassis.



Each Ethernet connector gets connected to Ethernet switches. These switches must be configured to 10M/100M/1G auto-negotiation.



Initial configuration must be done on all of the management modules. The first management module you configure will be the master.

### 3.4.4 USB

The USB port can be used to upload new SW using any storage device that has a USB connector. This interface is USB 2.0 compliant.

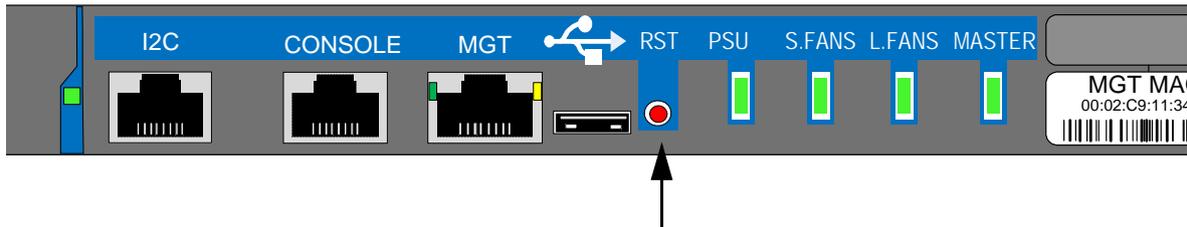
### 3.4.5 Reset – RST

The Reset button resets the chassis management module when the button is pushed. When the button is held down for 15 seconds the management module is reset and the password deleted.



DO NOT use a sharp pointed object such as needle or push pin for pressing the Reset button. Sharp objects can cause damage, use a flat object such as a paper clip.

**Figure 13: Reset Button**



This button resets the CPU of the management module. A quick push of this button performs this reset. When the reset button is pushed on the master management module this management module is reset becoming the slave and the other management module becomes the master. If there is only one management module in the chassis all of the leafs and ports are reset by bringing them down and powering them up when the reset button is pushed. When the button is held down for 15 seconds the management module is reset and the password is deleted. You will then be able to enter without a password and make a new password for the user admin.

## 4 Installation



This chassis can be installed in standard 19" racks that have depths between 65cm and 80cm between the vertical supports of the rack.

Installation and initialization of the chassis is a simple process requiring attention to the normal mechanical, power, and thermal precautions for rack-mounted equipment. Your chassis comes only with the power supplies and fans pre-installed. The rest of the openings are populated with blanks. All of the leafs, spines, and management modules come shipped in a separate package.

The chassis requires initial configuration to get the chassis and Fabric management up and running through remote management. See the Installation Guide that is packed in the box for the instructions to make the initial configuration.



This unit is intended for installation in a Restricted Access Location. A restricted access area can be accessed only through the use of a special tool, lock and key, or other means of security.

### 4.1 Environmental and Safety Recommendations

The following are Mellanox recommendations.



Recommended ambient temperature in the System room is  $20^{\circ} \pm 5^{\circ}$  C.  
Recommended humidity ranges is  $40\% \pm 15\%$  without condensing.



It is highly recommended that the installation sites be as isolated as possible from all sources of radio transmissions and electrical interference.



It is highly recommended that the installation site building be equipped with a lightning rod.



It is highly recommended that the installation site be equipped with smoke detectors and a fire alarm warning system.



The system requires a KVA rated UPS system. The heat dissipation is calculated (Power Dissipation x 3.42 = Heat Dissipation). It is recommended that a UPS system be installed to protect the equipment in the event of unexpected power failure.



Make sure that the outlets and circuits will not be overloaded. Spread out the load over at least two or three circuits or use a 3 phase circuit.

## 4.2 Chassis Package Contents

The package includes:

- 1 chassis with the following modules installed:
  - 6 spines
  - 1 management module
  - 4 fans
  - 4 PSUs

If you are not using a mechanical lift to install the chassis, reduce the weight of the chassis by removing all of the spines, power supply units, fan units, and management modules, and put aside for reinstallation after the chassis is installed in the rack.

- 1 installation kit
- 1 box containing
  - 4 power cords 250v 15a 2.0M, C14 to C13, USA UL Standard
  - 1 RJ45 to DB9 harness
- 1 cable management kit
- 1 Installation Guide

Before you install your new SX6512 series chassis, unpack the system and check to make sure that all the parts have been sent, check this against the parts list. Check the parts for visible damages that may have occurred during shipping.



If anything is damaged or missing, contact your customer representative immediately.



The rack mounting holes conform to the IEA-310 standard for 19-inch racks. Guarantee proper ventilation, by leaving 8cm (3”) of space to the front and rear of the switch. This will ensure proper air flow through the chassis. This is crucial for maintaining good airflow at ambient temperature. In particular, route cables such that they do not impede the air into or out of the chassis.

### 4.3 Leaf Package Contents

The leafs are ordered by the customer and are shipped 4 to a box. The customer will receive as many boxes as needed to fill the order.

### 4.4 Spine Package Contents

The spines are ordered by the customer and are shipped 3 to a box. The customer will receive as many boxes as needed to fill the order.

### 4.5 Management Package Contents

The package includes:

- all of the management modules ordered by the customer
- 1 RJ45 to DB9 harness for each management module received

### 4.6 Physical Installation



**Warning:** This equipment is very heavy. Safety is the first concern. The fully loaded chassis weighs ~265lbs (~120 kg). Make sure that proper manpower and equipment is used for transporting and moving the chassis. Before attempting to move and place the chassis make sure that it is empty of all leafs, spines and management modules and use the IBM Rack Lift Tool or another type of mechanical lift.

The switch platform uses 10U of rack space in a standard 19” rack, 9U for the chassis and 1U for the shelf. The switch ships from the factory with mounting holes on the spine side. There are upper brackets to connect the leaf side to the rack near the top of the chassis. The weight of the switch is supported from underneath the unit by the shelf.

This chassis can be installed in standard 19" racks that have between 65cm and 80cm between the vertical supports of the rack. Make sure that a fully populated rack including cables will have sufficient air flow for cooling.



Choose a rack which is able to support the mechanical and environmental characteristics of a fully populated switch chassis.

#### 4.6.1 6518ESD Connection

Before starting any procedure on the SX6512 series switch system:

1. Put an ESD prevention wrist strap on your wrist, and make sure there is good contact between your body and the strap.
2. Plug the other end of the wrist strap to a valid ground. Make sure that this is a tight fit.

#### 4.6.2 Installation Procedure

##### 4.6.2.1 Requirements

You will need:

- #2 phillips screwdriver
- #3 phillips screwdriver
- a grounding lug
- ground wire to properly ground the chassis



The installation will be much easier with a power screwdriver.



It is recommended to use AWG6 or 4mm diameter wire for grounding purposes.



It is recommended to have at least two people for the duration of the installation procedure. Use the IBM Rack Lift Tool, or another type of mechanical lift to raise this chassis. Use enough manpower to ensure the safety and wellbeing of all of the people involved in the installation.

#### Parts for installing the shelf

- 1 shelf
- 16 M6 bolts for the caged nuts 8 for the shelf and 8 for the faceplate
- 16 caged nuts 8 for the shelf and 8 for the faceplate
- 2 Shelf rail slides

#### Parts for installing the chassis

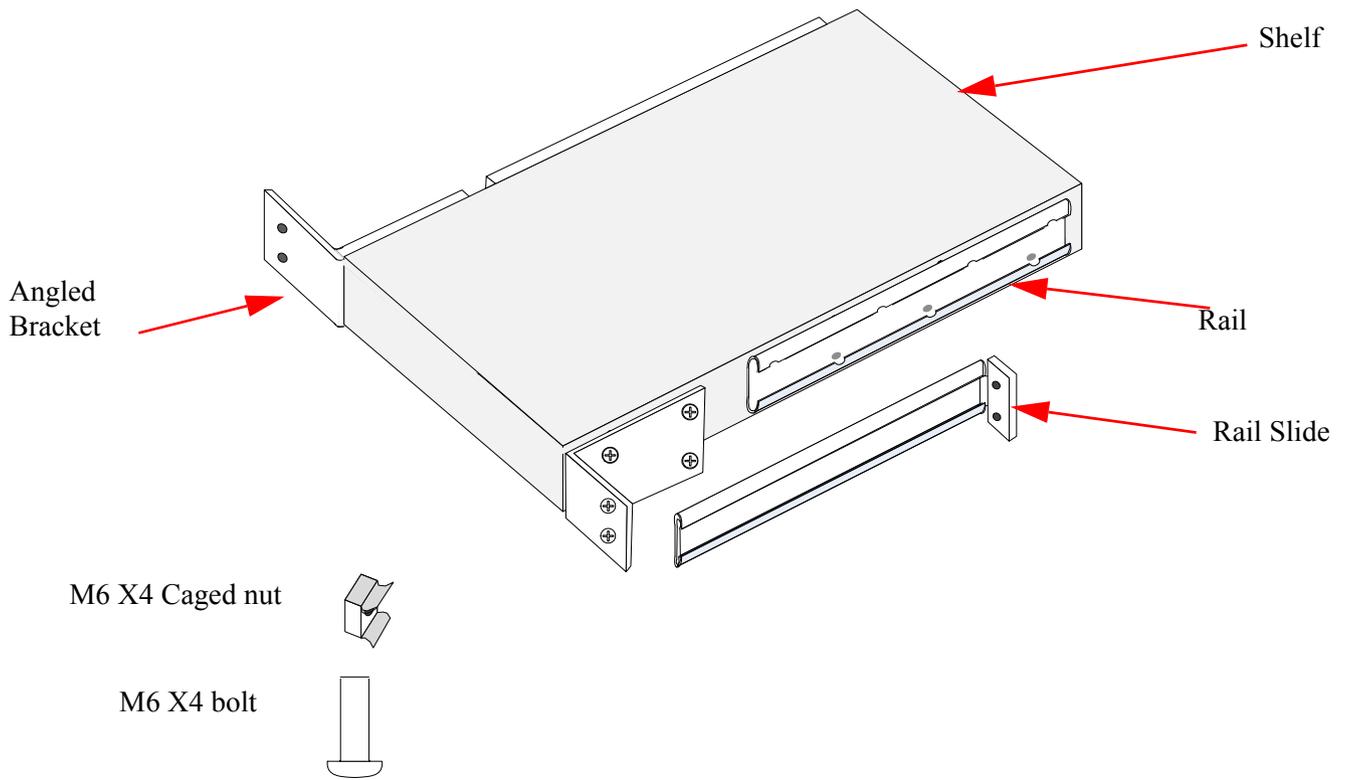
- 2 Chassis rail slides
- 4 Handles
- 8 pan head bolts
- 8 Allen head screws
- 2 Flat 4 hole metal spacers
- 1 allen wrench
- 8 split lock washers

#### Parts for installing the cable manager

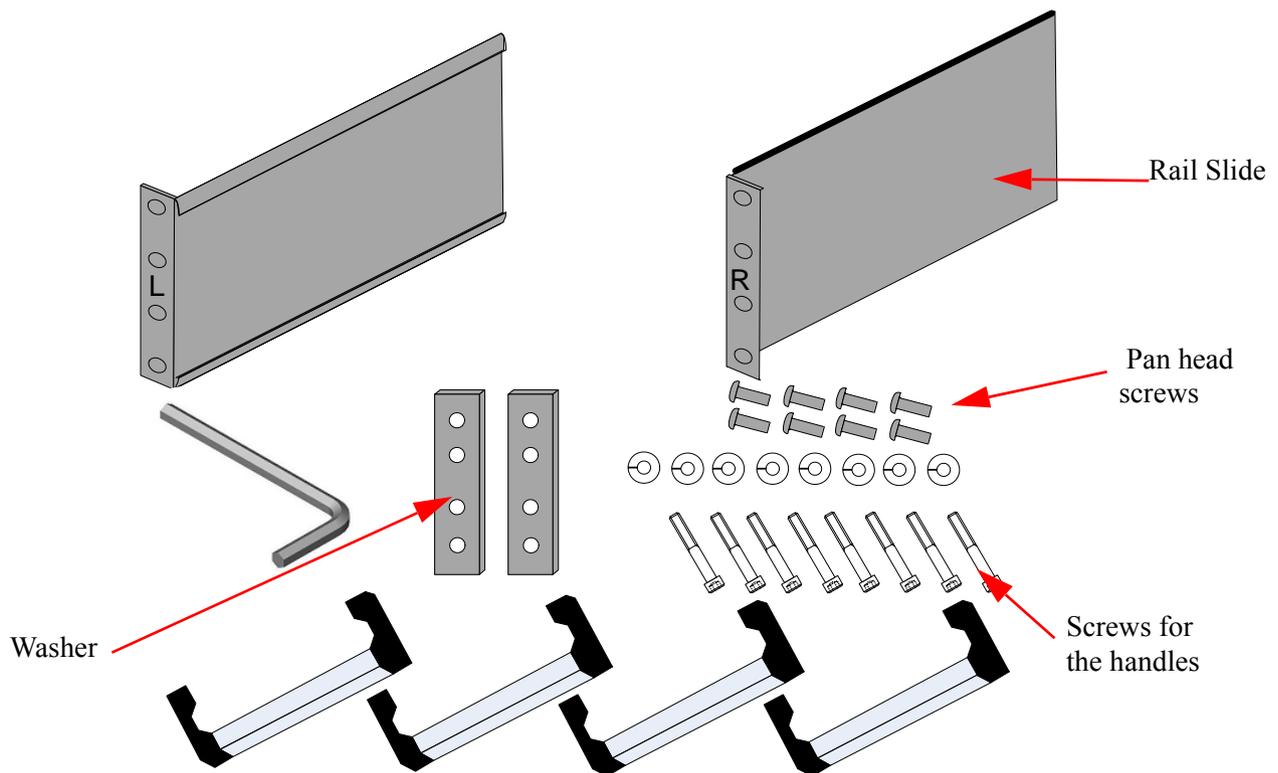
- 1 RH cable holder
- 1 LH cable holder
- 8 caged nuts M6
- 8 M6 bolts

You will need 10 U of space in the rack. Nine U for the chassis and one U for the shelf.

**Figure 14: Shelf Installation Kit Parts**



### 4.6.2.2 Opening the Container



1. Before starting the procedure, put the ESD strap on and connect it to a valid ground.
2. Open the crate by opening the latches.
3. Unscrew the sides of the crate.
4. Remove and put aside the box containing the cables.
5. Remove and put aside the box containing the cable management kit.
6. Remove and put aside the box containing the Installation kit.
7. Visually inspect the chassis, make sure that:
  - there is no visible damage
  - 4 PSUs are installed
  - all 4 fans are installed
8. Remove all protective plastic film from all sides and top of the chassis.
9. If you are not using a mechanical lift to install the chassis, reduce the weight of the chassis by removing all of the spines, power supply units, fan units, and management modules, and put aside for reinstallation after the chassis is installed in the rack.

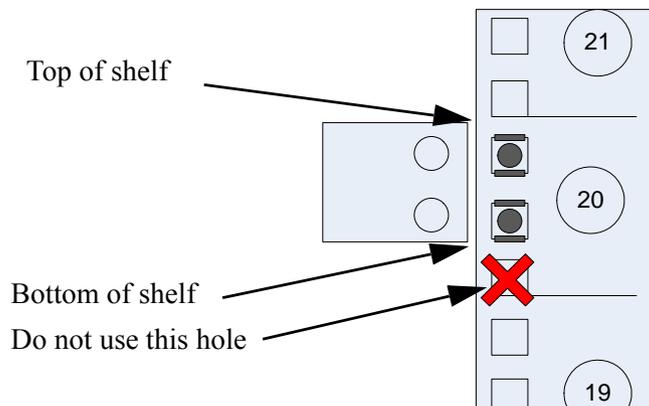


The leafs, spines, and management modules are shipped separately.

#### 4.6.2.3 Installing the Shelf

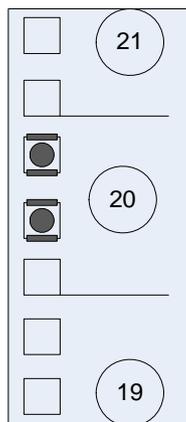
1. Place the ESD mat on the floor where you will be working and put on the ESD strap. Make sure the ESD strap is touching your skin and that the other end is connected to a verified ground.
2. Clip 4 caged nuts into the holes in the rack you will be using to connect the brackets. Check that both sides of the shelf are at the same level in the rack.

**Figure 15: Inserting the Caged Nuts for the Shelf**



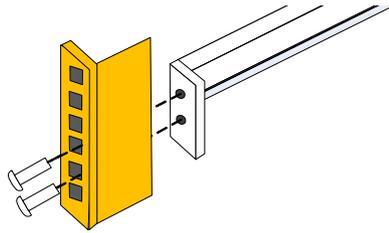
3. Clip 4 caged nuts into the holes in the rack you will be using to connect the rail slides. Check that both sides of the shelf will be at the same level in the rack.

**Figure 16: Use These Holes for the Rail Slides**



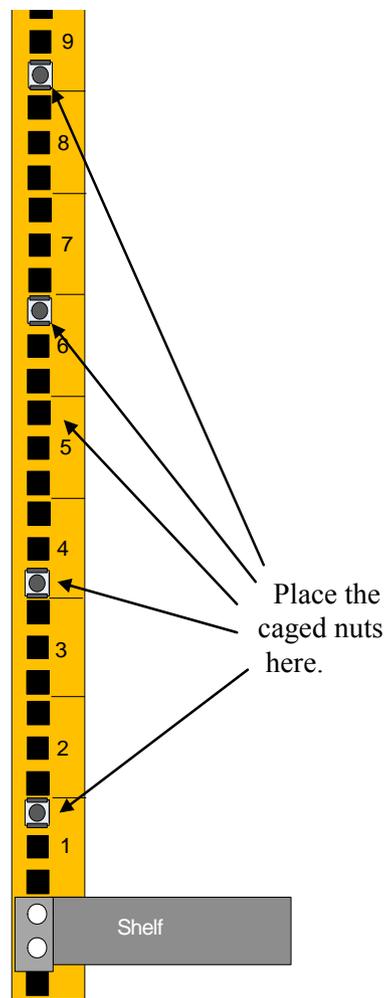
4. Using two of the bolts for each rail slide, install the rail slides onto the rack. Check that both sides of the switch, left and right, are the same level in the rack.

**Figure 17: Connect Rail Slide to Rack Vertical support**



5. Place the four bolts for the caged nuts within reach.
6. Slide the shelf into the rail slides.
7. Put the shelf into place and screw the bolts into the nuts from step 2.
8. Tighten all of the screws to 9.2 Nm or 81.5 pound inches.
9. Insert 8 caged nuts for the faceplate in the exact locations shown in Figure 18, “Inserting the Caged Nuts for the Faceplate”.

**Figure 18: Inserting the Caged Nuts for the Faceplate**

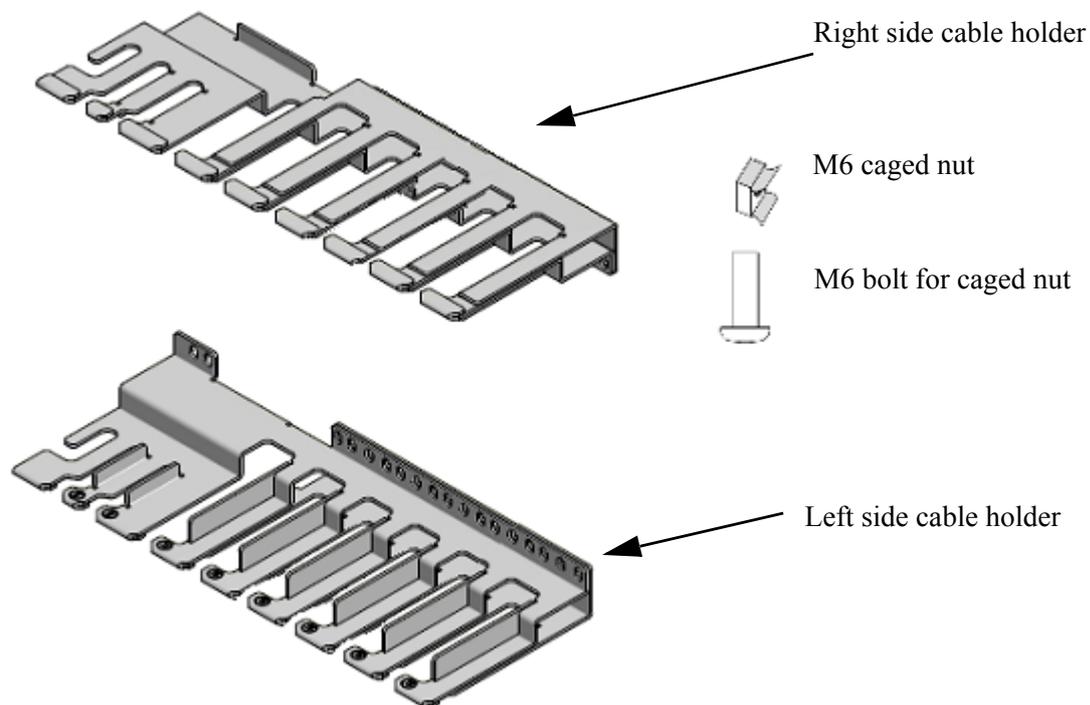


### 4.6.3 Installing the Cable Holder



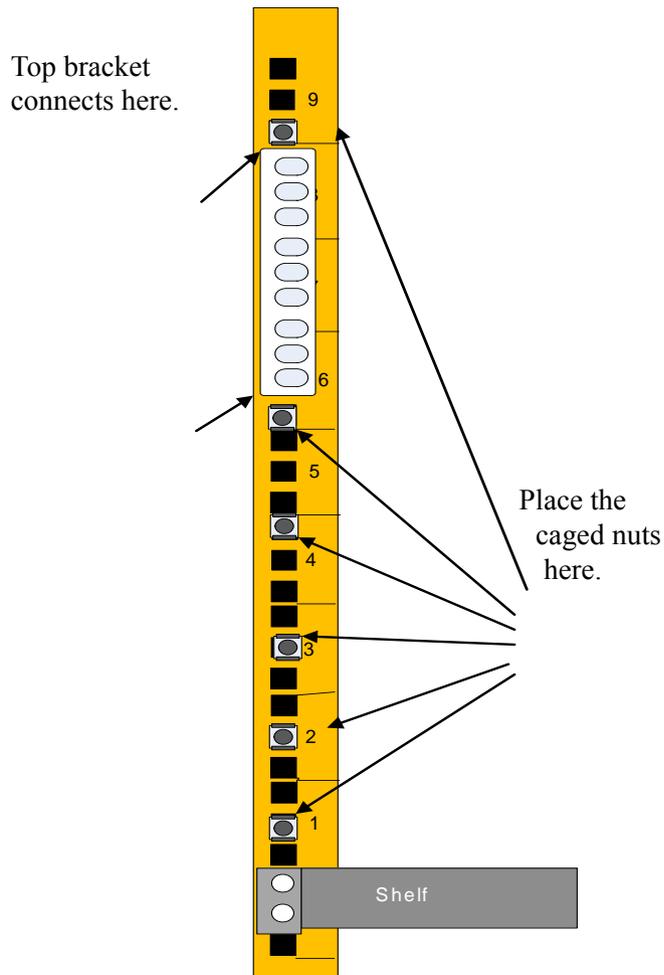
Now is the time to install the cable holder.

**Figure 19: Cable Holders**



1. Place the Cable holder next to the rack, on the connector side of the chassis, and identify the holes where the caged nuts are to be placed.

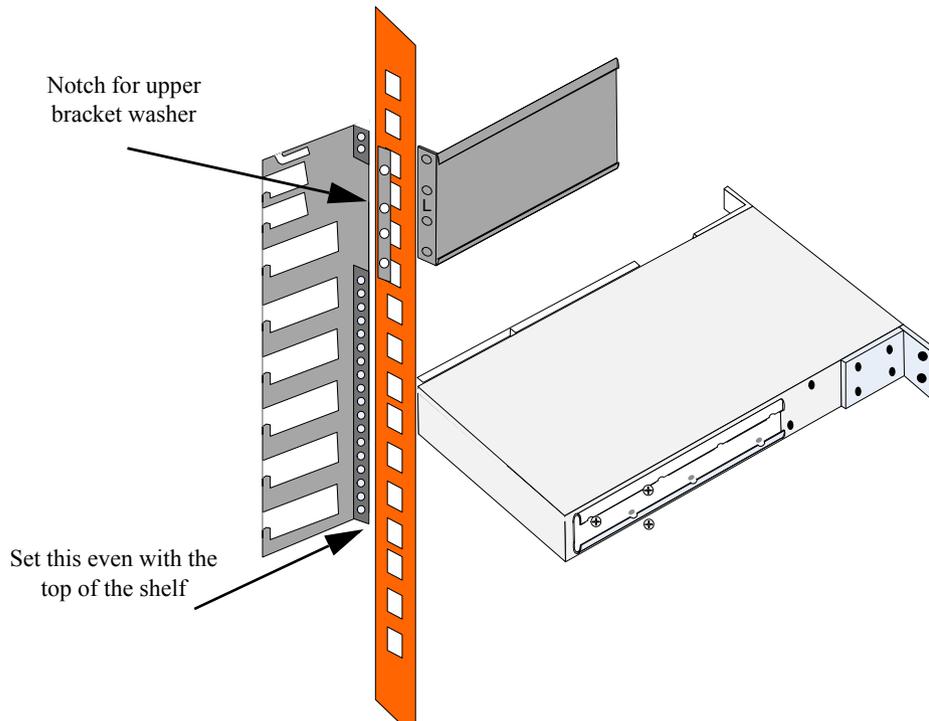
**Figure 20: Inserting the Caged Nuts for the Cable Holder**



The cable holders should go to the outside of the vertical supports.

2. Set the bottom of the cable holder at the level of the shelf.

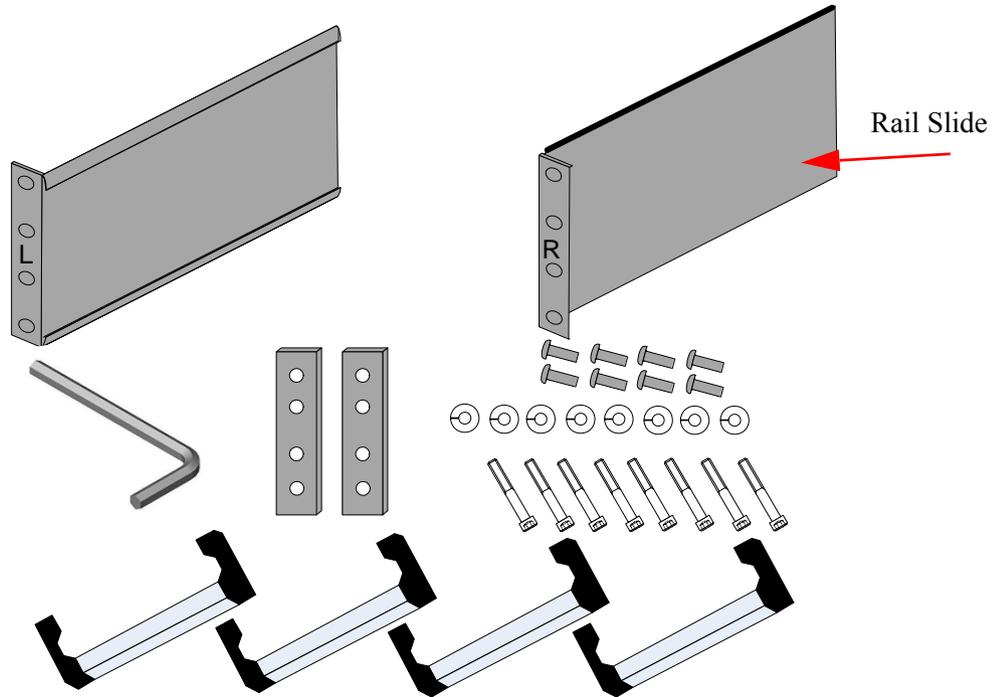
Note: If the cable holder is not set properly the upper bracket will not line up with the cable holder.

**Figure 21: Cable Holder Placement**

3. Screw the cable holder onto the rack using the screws provided.
4. Repeat steps 1- 3 for the second cable holder.

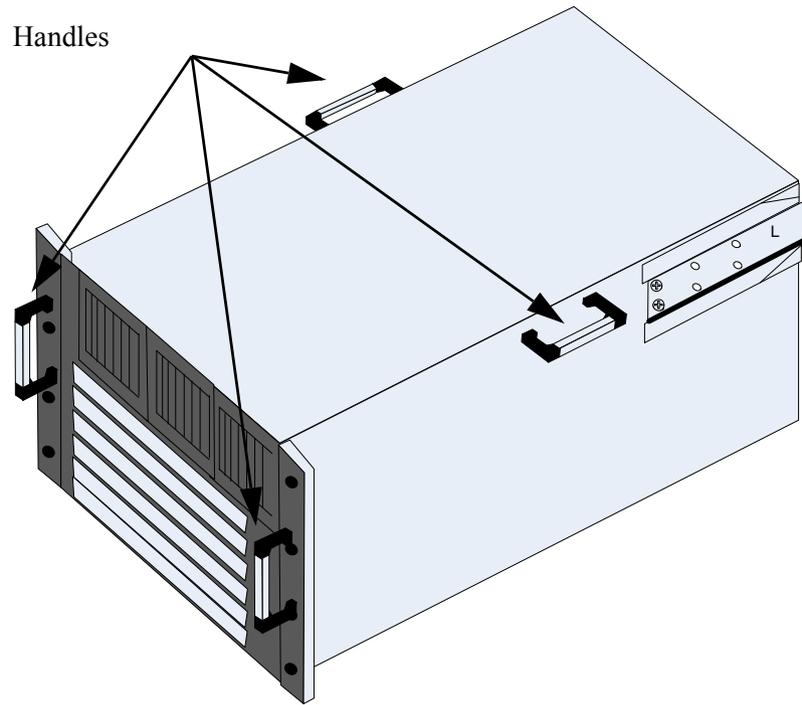
## 4.6.4 Installing the Chassis

**Figure 22: Chassis Rails and Rail Slides**

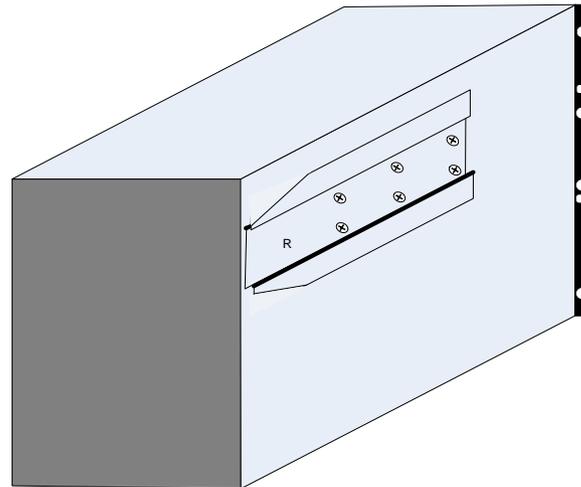


1. Screw the handles onto the chassis. Use the 8 allen head screws. Two go on the faceplate and two go on the sides of the chassis.

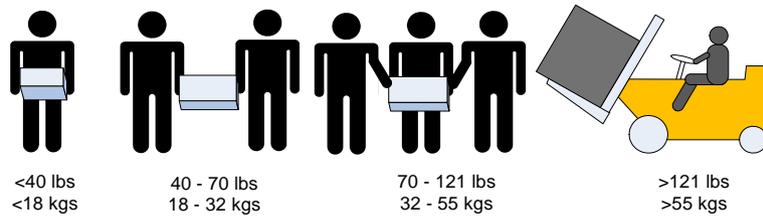
**Figure 23: Screw the Handles Onto the Chassis**



**Figure 24: The Rails are Already Connected Onto the Chassis**

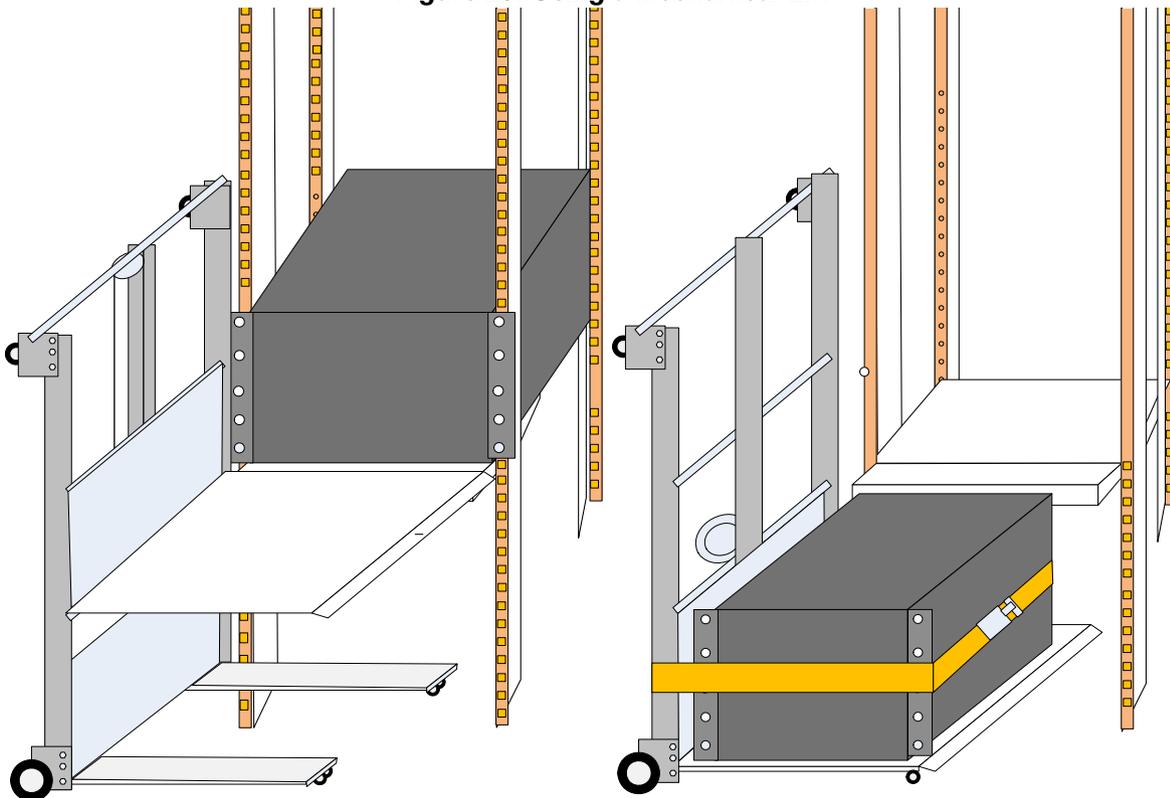


When lifting manually use your legs, **bend your knees**, and **not** your back.



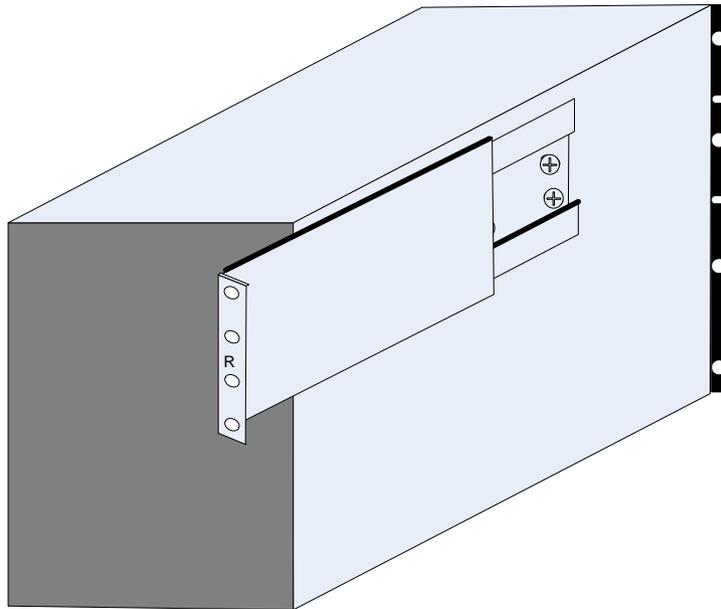
2. Lift the chassis and slide it onto the shelf. Use a mechanical lift or enough people to safely lift the chassis. A full chassis weighs ~120 kgs an empty chassis weighs ~50 kgs.

**Figure 25: Using a Mechanical Lift**



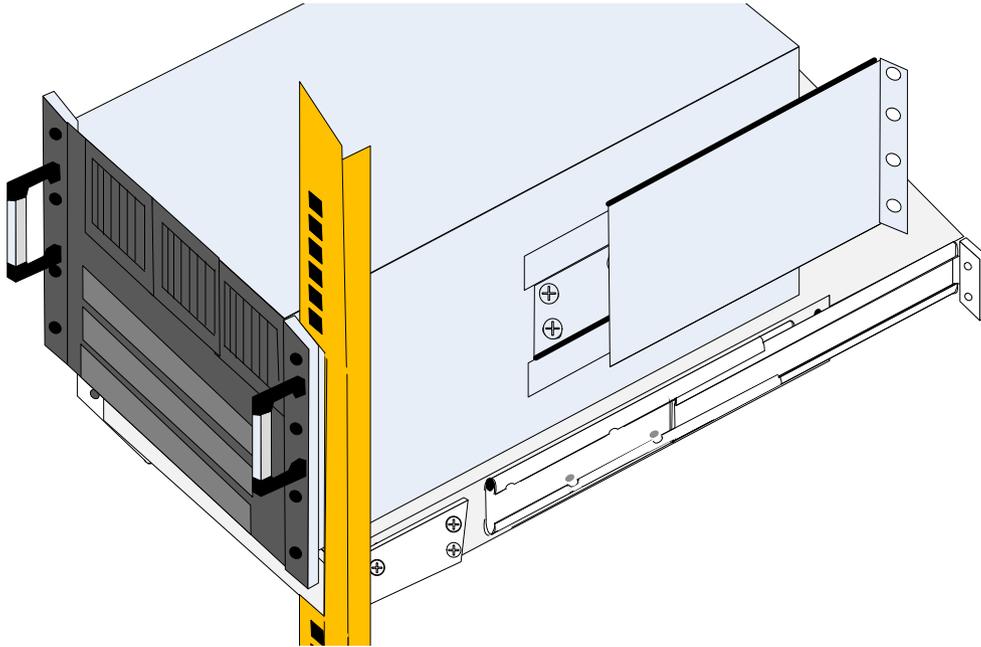
3. Remove the two handles from the sides of the chassis.
4. Push the chassis into the rack until the faceplate is ~ 20cm (~ 8") from the vertical support.
5. Put the rail slides onto the rails.

**Figure 26: Put on the Rail Slide**



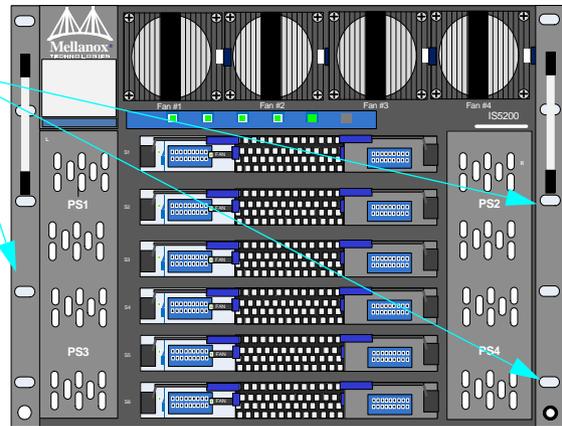
6. Slide the chassis further into the rack.
7. Slide the chassis all the way into the rack until the faceplate is touching the vertical rack support. The caged nuts placed in the last procedure should line up with the holes in the faceplate.
8. Screw the 8 screws through the faceplate and into the caged nuts.
9. Slide the rail slides to the vertical rails.

**Figure 27: SX6512 Chassis on the Shelf**

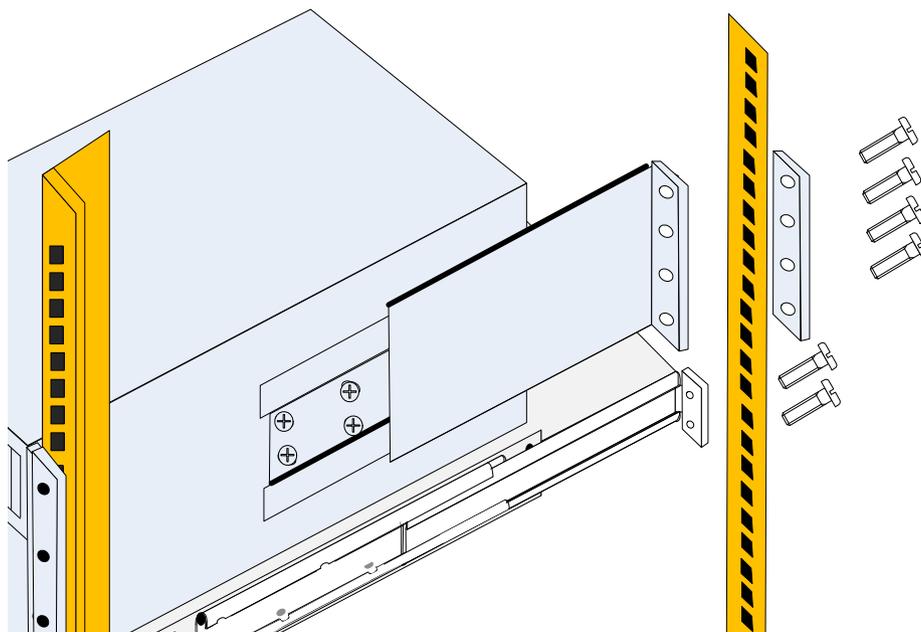


**Figure 28: Face Plate Mounting Bolt Locations**

Holes in the faceplate for mounting on the rack.



**Figure 29: Move the Rail Slide to the Vertical Support**



10. Place the 4 holed spacer on the outside of the vertical support and screw in the 4 screws for each rail slide.
11. Remove the two handles from the spine side and save all four handles for future use.
12. Ground the switch.
13. Replace all of the spines, power supply units, fan units, and management modules removed at the start of the installation procedure.
14. Plug in the power cables.
15. Check the Status LEDs and confirm that all of the LEDs show status lights consistent with normal operation.



**Warning:** Any yellow status LEDs is cause for concern and must be dealt with immediately.

It can take up to 5 minutes to boot up, during which time the status LED may indicate red.

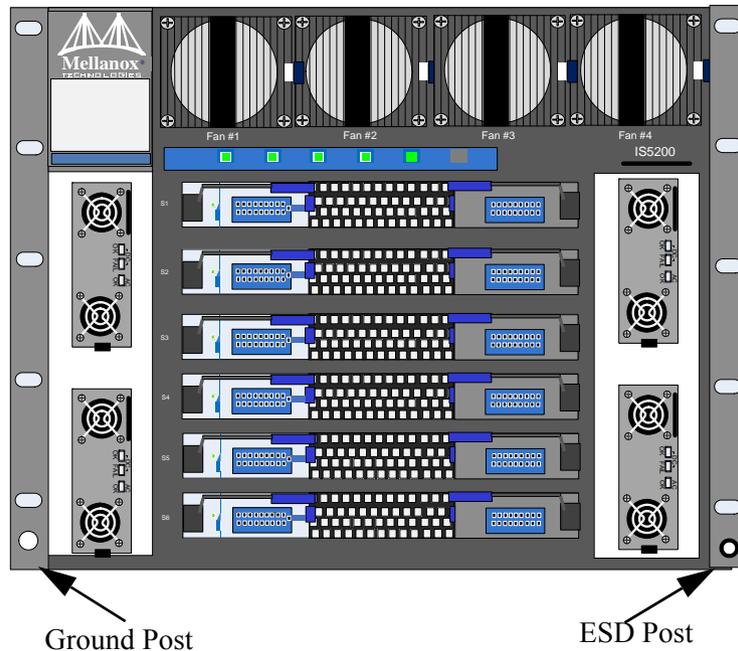
16. You can start connecting all of the cables to the switch.

#### 4.6.5 Ground Connections

Make sure to connect the ground post to a valid electrical ground. Use a grounding lug and a ground wire of sufficient capacity to safely convey a potential discharge. A ground wire of AWG 6 or 4mm diameter is recommended for grounding this device. The chassis is concurrently grounded through each of the PSUs. Only connect the PSU cords to properly grounded outlets. Do not rely on the PSU grounds. It is absolutely necessary to connect the grounding post. Make sure the connections are solid and permanent. If you choose to not use the ground screw, make sure that the

rack is properly grounded and that there is a valid ground connection between the chassis of the switch and the rack. Test the ground using an Ohm meter.

**Figure 30: Ground Connection**



## 4.7 Power Connections

The switch includes integrated hot-swap power supplies which support up to 4 load-sharing 1000W supply units. The slots for the power supply units (PSUs) are on the spine side. The left side has odd numbered PSUs and the right side has even numbered PSUs. Each PSU has a dedicated AC inlet. This design enables the optional use of separate main and backup AC feeds. The input voltage is Autorange, 100-240 VAC, 50Hz or 60Hz. The output voltage for the PSUs is 48V. The power cords should be standard 3-wire AC power cords including a safety ground.

Before starting any procedure on the SX6512 series switch system put an ESD prevention wrist strap on your wrist and connect to the SX6512 series chassis.

### 4.7.1 Powering Up the Switch Platform



Make sure that the power cords are compatible with your outlets. Power cords for different countries can be ordered from Mellanox.

1. Plug in the power cords to the PSUs.
2. Plug the other end of the power cord into a grounded outlets.



Make sure that the outlets and circuits will not be overloaded. Spread out the load over at least two or three circuits or use a 3 phase circuit.

The chassis must be started with a full compliment of PSUs, thereafter it can run on one less than the total number of PSUs. This final PSU is redundant and allows for hot swapping a PSU should one fail. Connecting the PSUs to different AC lines provides AC failover protection.

A system should continue to run and allow a hotswap of a defective PSU. Should there not be enough power to keep all of the leafs running, MLNX-OS may power down some leafs. If this happens it may be necessary to reboot the chassis once the defective PSU has been replaced.

The power system will divide the current consumption by the number of working PSUs. Should one of the PSUs fail, the total current consumption will then be divided by the remaining working PSUs. When the failed PSU is hot swapped the new PSU will ramp up and pass its share of current, so that the total current is always divided by the number of working PSUs.

### **Figure 31: Multiple Power Inlets - Electric Caution Notification**

#### **CAUTION**

Risk of electric shock and energy hazard.  
The PSUs are all independent.

Disconnect all power supplies to ensure a powered down state inside of the switch platform.

#### **ACHTUNG**

Gefahr des elektrischen Schocks.  
Entfernen des Netzsteckers  
elnes Netzteils spannungsfrei.  
Um alle Einheiten spannungsfrei  
zu machen sind die Netzstecker  
aller Netzteile zu entfernen

#### **ATTENTION**

Risque de choc et de danger  
e'lectriques. Le de'branchment  
d'une seule alimentation stabi-  
lise'e ne de'branch uniquement  
qu'un module "Alimentation  
Stabilise'e". Pour isoler com-  
pletement le module en cause, Il  
faut de'brancher toutes les ali-  
mentations stabilise'es.

3. Check the Status LEDs on all of the management modules and confirm that all of the LEDs show status lights consistent with normal operation.



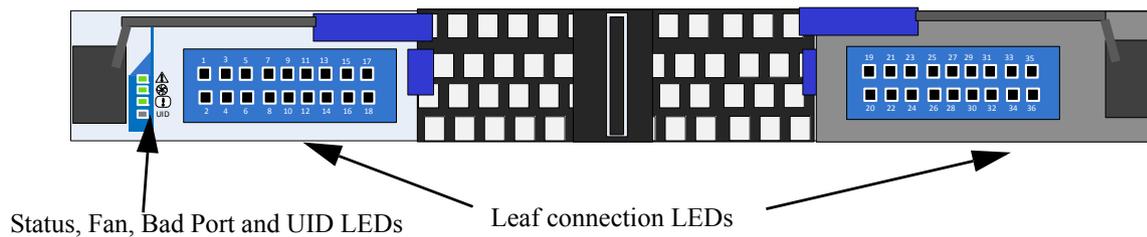
Any yellow or red status LEDs on any of the management modules is cause for concern and must be dealt with immediately.

4. Check that none of the LEDs on the spines are yellow.



It can take up to 5 minutes to boot up the system. During this time the status LEDs may be RED. Turn off the system if any LEDs remain red for more than 5 minutes.

5. Check that the Leaf status LED, Fan status LED, and Spine status LED in the spines are all green.

**Figure 32: Spine Module**

## 4.8 InfiniBand QSFP Cable Installation

The switch uses industry standard QSFP InfiniBand cables which are available from Mellanox Technologies. The Mellanox propriety QSFP cables support full 56+56Gb/s (FDR), 40+40Gb/s (FDR10), 40+40Gb/s (QDR), 20+20Gb/s (DDR) and 10+10Gb/s (SDR) bidirectional wire speed of the switch ports. The standard QSFP cables support full 40+40Gb/s (QDR), 20+20Gb/s (DDR) and 10+10Gb/s (SDR) bidirectional wire speed of the switch ports. All InfiniBand QSFP connections are made to the leaf boards. Each leaf has 18 InfiniBand QSFP connectors in two rows, which are numbered 1-18. See Section 3.1.6 for port numbering.



If maximum cable lengths are exceeded data transfer will be reduced and the bit error rate will increase.



FDR BandWidth is supported only by MLNX QSFP cables.



FDR and FDR10 are only guaranteed to work with approved Mellanox Cables.

All cables can be inserted or removed with the unit powered on. To insert a cable, press the connector onto the port receptacle until the connector is firmly seated. The orange LED indicator above the port will light when the physical connection is established (when both ends of the cable are properly connected to working devices). Allow 15 seconds for link to get up. To remove, disengage the lock and slowly pull the connector away from the port receptacle.



For a valid physical connection both ends of the cable must be connected to working devices.



Take care to not impede the air flow through the ventilation holes next to the Infini-Band ports. Use cable lengths which allow routing horizontally around to the side of the chassis before bending upward or downward in the rack.

### 4.8.1 Cable Power Classes

Chassis and switches need to be able to dissipate the heat generated by high power I/O cables and modules. The Mellanox SX 65XX series chassis are rated for cables up to class 2 as per the SFF committee classification ([SFF-8436.PDF](#)).

See <http://www.mellanox.com/content/pages.php?pg=cables> for the cable class rating of Mellanox cables.

## 5 Chassis Power Up

Before starting any procedure on the SX6512 series chassis system put an ESD prevention wrist strap on your wrist and connect to the SX6512 series chassis.

The chassis must be started with a full complement of PSUs, that is 4. Thereafter it can run on one less than the total number of PSUs. This final PSU is redundant and allows for hot swapping a PSU should one fail. Connecting the PSUs to different AC lines provides AC failover protection.

A system should continue to run and allow a hotswap of a defective PSU. Should there not be enough power to keep all of the leafs running, MLNX-OS may power down some leafs. If this happens it may be necessary to reboot the chassis once the defective PSU has been replaced.

1. Check all:
  - Boards
  - Power supplies
  - Leaf fan modules
  - Spine fan modules
    - for proper insertion and seating before connecting the AC power cords.
2. Insert all leafs that you plan to use, in the chassis.
3. Insert thermal blanks in unused leaf slots to maintain balanced air flow.
4. Tighten all mounting screws.
5. Connect the power cords to the PSUs.
6. Connect the power cords to grounded electrical outlets.



Do not power up the chassis with less than all PSUs installed.



Populate the chassis with the leafs before you power up the chassis.

### 5.1 Power Supply and Spine Board Indicator Status at Power ON



It can take up to 5 minutes to boot up the system. During this time the status LEDs may be RED. Turn off the system if any LEDs remain red for more than 5 minutes.

As the power is turned on, you should observe the following conditions for normal operation:

1. Power Supply Unit(s) AC OK and DC OK indicators are ON and FAIL indicators are OFF.
2. There is a *green* Status LED per spine board, per leaf board, and per management module that indicates power supplies are good.

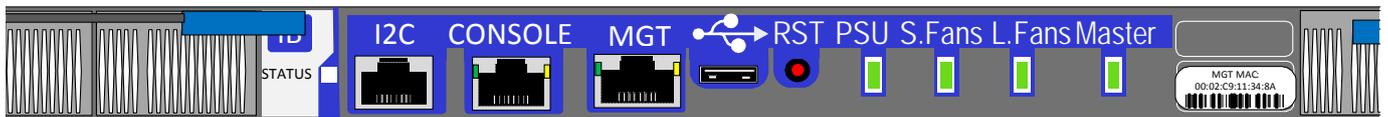
3. Spine Board indicators will display status of internal links to the installed leaf boards. All PHY links to existing leaf Boards should be ON.
4. Check the Spine LEDs and make sure they coincide with Figure 33.

**Figure 33: Spine Side Panel Display Status Indications**



5. Check the Spine LEDs and make sure they coincide with Figure 34.

**Figure 34: Management Module Status Indications for Normal Operation**



## 6 Insertion and/or Hotswap Extraction

Before starting any procedure on the SX6512 series switch system, put an ESD prevention wrist strap on your wrist and connect to the SX6512 series chassis.



When hotswapping any of the units, it is necessary to wait 1 minute after removing the defective part before inserting the new part. This is necessary so that the management module will start a new cycle checking through the leafs and spines for the FW versions.

This switch platform supports Hotswap capabilities for the:

- Power supply units
- Leaf boards
- Spine boards
- Leaf fan module
- Spine fan module
- Management modules

### 6.1 Power Supply Units



When hotswapping any of the units, it is necessary to wait 1 minute after removing the defective part before inserting the new part. This is necessary so that the management module will start a new cycle checking through the leafs and spines for the FW versions.

A PSU (Power Supply Unit) can be extracted without bringing down the system, as long as no more than one PSU is bad.

The power required to run the switch system is equally divided between all of the working PSUs.

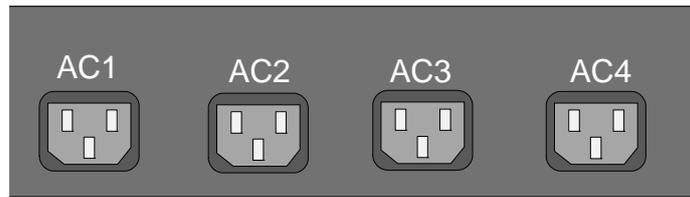
#### 6.1.1 Extracting and Inserting the Power Supply Unit

With all of the power supplies installed, the system is in the redundant configuration, any single PSU may be extracted without bringing down the system.

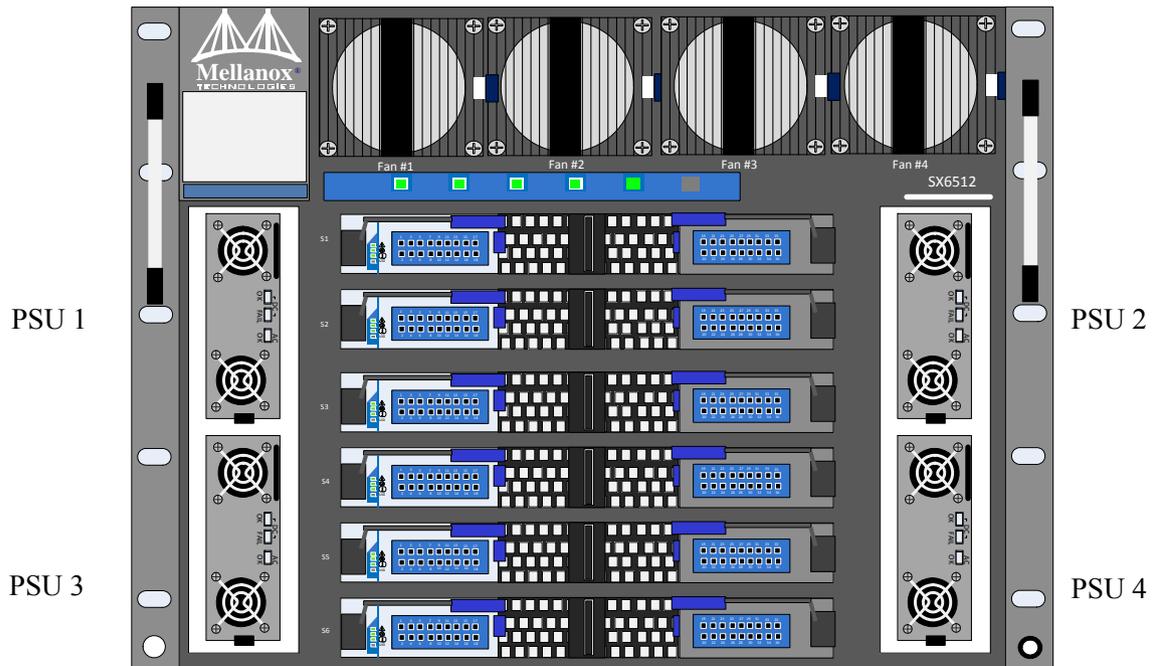
**To extract a PSU:**

1. Determine which AC connector on the connector side of the chassis corresponds to the defective PSU.
2. Remove the power cord from the power supply unit. Note which power cord it is according to the AC numbering.

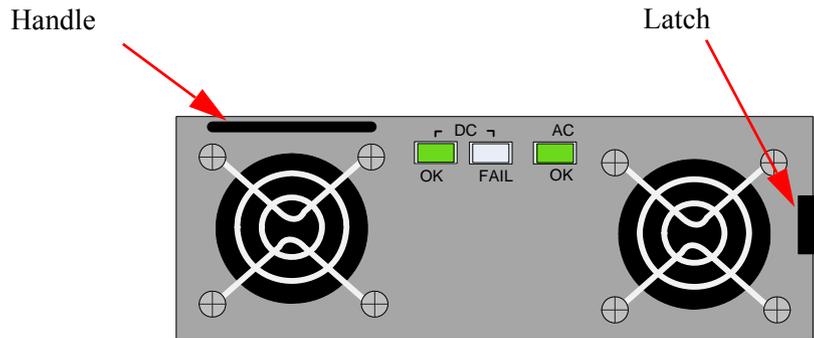
**Figure 35: Power Cord Bar**



**Figure 36: PSU Locations**



3. On the spine side of the chassis, remove the cover to the power supply unit for the non-working PSU.

**Figure 37: Power Supply**

4. Grasping the handle with one hand, push the black latch release while pulling the handle outward. As the PSU unseats, the PSU status indicators will turn off.
5. Remove the PSU.

**To insert a PSU:**

1. Make sure the mating connector of the new unit is free of any dirt and/or obstacles.
2. Insert the PSU by sliding it into the opening until a slight resistance is felt.
3. Continue pressing the PSU until it seats completely. The latch will snap into place confirming the proper installation.
4. Insert the power cord into the supply connector on the other side of the chassis.
5. Replace the cover over the PSUs.

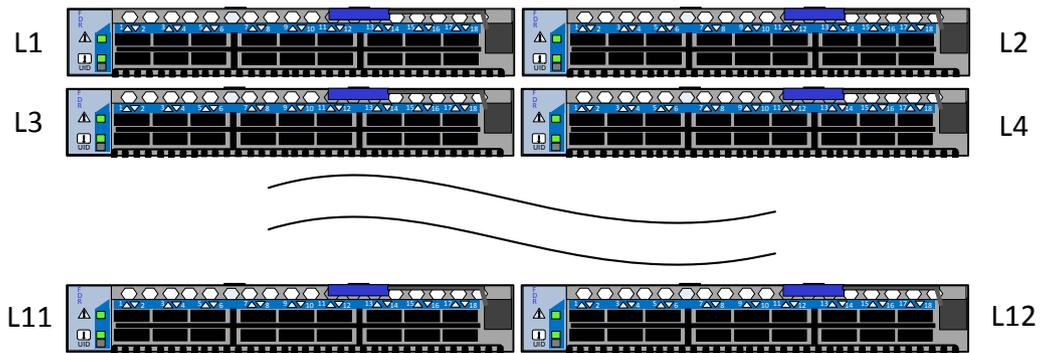


The green indicators should light. If not, extract the PSU and re-insert it again.

**6.2 Leaf Boards**

When hotswapping any of the units, it is necessary to wait 1 minute after removing the defective part before inserting the new part. This is necessary so that the management module will start a new cycle checking through the leafs and spines for the FW versions.

The leaf boards are numbered from top to bottom, with corresponding numbers displayed to the outside of the leafs vertically along the side panel.

**Figure 38: Leaf Board Numbering**

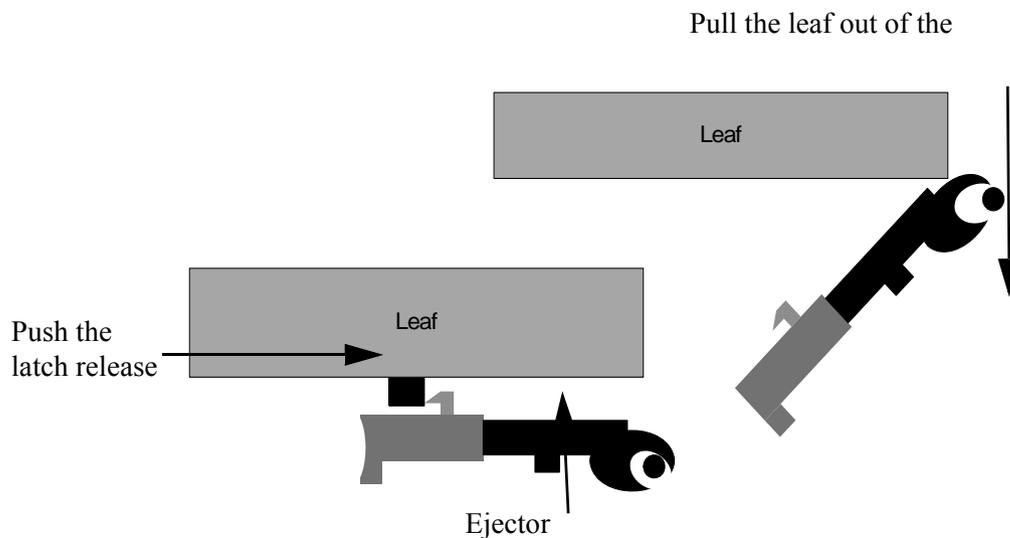
### 6.2.1 Extracting a Leaf Board

Each leaf board has an ejector that locks the board in place and serves as a lever for seating or extracting (see Figure 48).

1. Run the leaf shut down command.

```
no power enable <module>
switch-1 [Orca648: master] (config) # no power enable L16
```

2. Disconnect all cables connected to the leaf.
3. Push the latch to unlock the ejector from the chassis.
4. Open the ejector until it is 90 degrees from the leaf.
5. Pull out on the leaf.

**Figure 39: Ejector Latch**

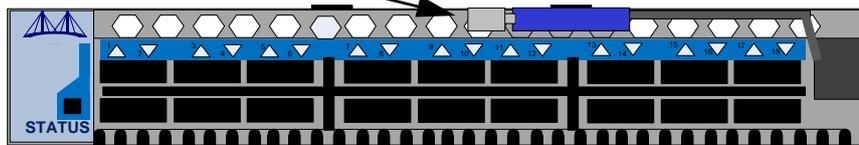


The board is short, therefore do not let go of it while sliding it out.

**Figure 40: Leaf Release**

Push here to release the latch

Pull the ejector to remove the leaf



## 6.2.2 Inserting a Leaf Board

Start with the latch fully open, that is perpendicular to the front panel of the leaf. Carefully set the leaf board into the side guide rails and slowly slide the board into the chassis. Catch the hooks onto the vertical bar and push the latch shut.

## 6.3 Spine Boards



When hotswapping any of the units, it is necessary to wait 1 minute after removing the defective part before inserting the new part. This is necessary so that the management module will start a new cycle checking through the leafs and spines for the FW versions.

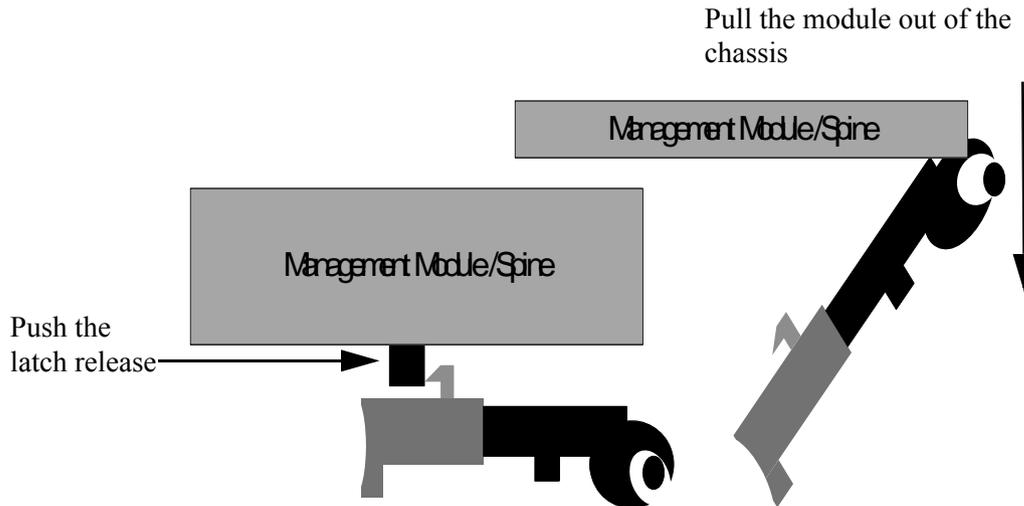
Each spine has a pair of ejectors that lock the board in place and serve as levers for seating or extracting (see Figure 41).

### 6.3.1 Extracting a Spine Board

1. Run the spine shut down command.

```
no power enable <module>
switch-1 [Orca648: master] (config) # no power enable S06
```

2. Push outward on the latches to unlock the ejectors from the chassis.
3. Open the ejectors until they are 90 degrees from the module.
4. Pull out on the module using both ejectors.

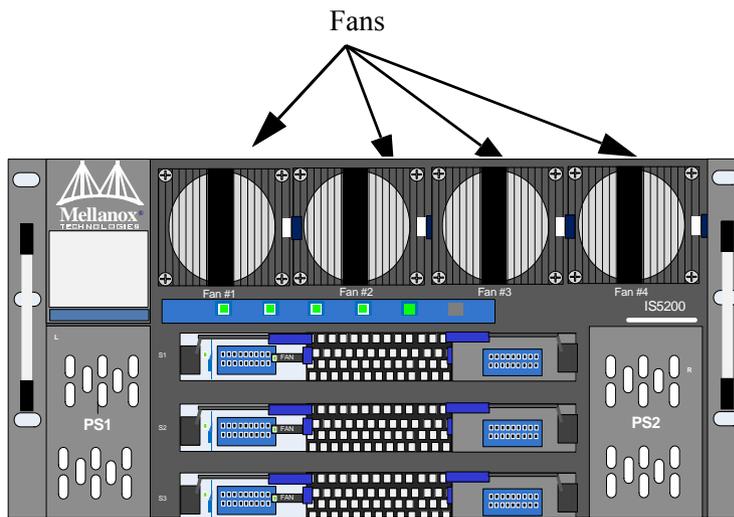
**Figure 41: Ejector Latch****Figure 42: Spine Board Extraction**  
Pull the latches to remove the spine.

### 6.3.2 Inserting a Spine Board

1. Start with the latches fully open, that is perpendicular to the front panel of the leaf.
2. Hold the spine board by the sides with both latches fully open.
3. Insert the board into its rail. The board should slide in *without* resistance.
4. Push the board in until the hooks on the latches are touching the vertical bar.
5. Now press both latches inward simultaneously. You should feel the latches are hooked into the front panel.
6. Press both latches applying some force to close them completely. The locking latch will engage.

## 6.4 Fan Modules

There are four fan modules on the chassis for the leafs. They are located on the spine side, along the top of the chassis. When a fan module is not functioning the status LED on the fan will light up.

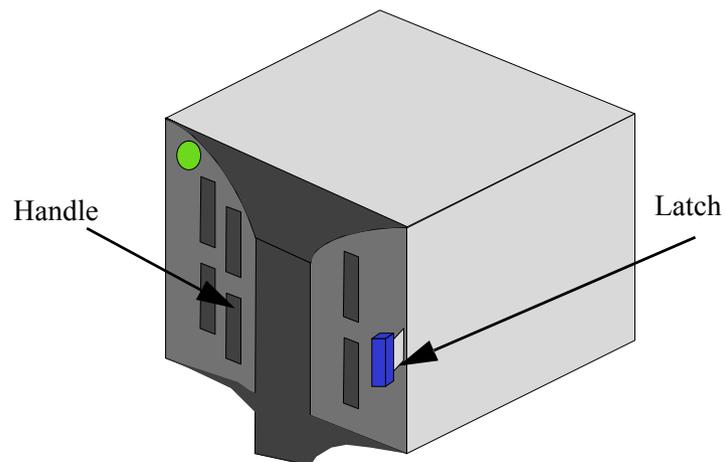
**Figure 43: Fan Locations on the Chassis**

### 6.4.1 Leaf Fan Module

There are 4 Leaf fan modules found on the Spine side.

#### 6.4.1.1 Extracting the Leaf Fan Module

1. Push and hold the blue latch release. See Figure 44.
2. Slowly pull out the fan module using the handle.

**Figure 44: Leaf Fan Module Extraction**

#### 6.4.1.2 Inserting the Leaf Fan Module

1. Make sure the fan module is oriented correctly top side up. Confirm that the location of the connector in the chassis will line up with the connector in the fan module.

- Slowly slide in the new leaf fan module.



If the fan module stops before it goes in all of the way it is inserted incorrectly!

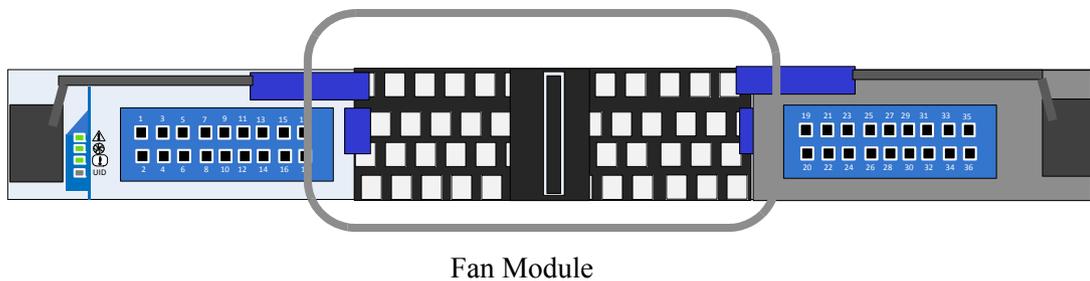
- Push the fan module until the latch engages.
- Make sure that the green leaf LED on the module comes on (indicating that fan is running).

## 6.4.2 Spine Fan Modules

Each spine fan module contains two individual fans. Should a single fan fail the Fan Status LED on the spine and on the management module will light, indicating the necessity to replace the fan module. Air flow through the spines is independent of the air flow through the leaves.

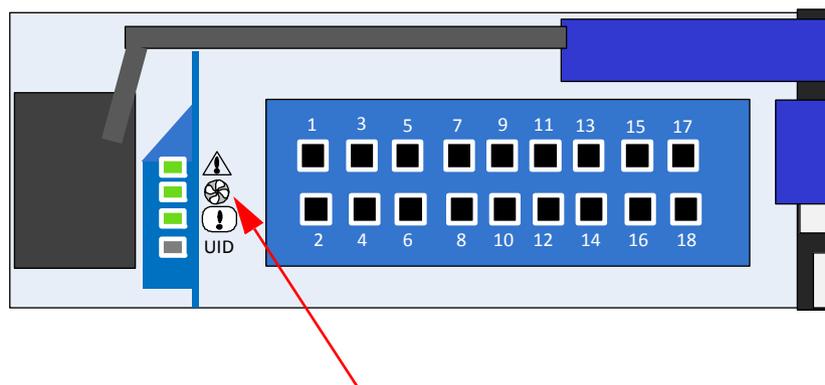
Each spine module has a fan module with two individual fans built in. When a fan module is not functioning the status LED on the fan will light up.

**Figure 45: Spine Fan Module**



When a fan module is removed the indicator light will reset.

**Figure 46: Fan Status LED on the Spine Module**



### 6.4.2.1 Extracting the Spine Fan Module

- Push the two blue latch buttons together while pulling the fan module out.

### 6.4.2.2 Inserting the Spine Fan Module

1. Make sure the fan module is oriented correctly top side up. Confirm that the location of the connector in the chassis will line up with the connector in the fan module.
2. Slowly slide in the new spine fan module.
3. Push the fan module as far as it will go, make sure the locking latches engage.

## 6.5 Management Module



When hotswapping any of the units, it is necessary to wait 1 minute after removing the defective part before inserting the new part. This is necessary so that the management module will start a new cycle checking through the leafs and spines for the FW versions.

Before starting any procedure on the SX6512 series switch system put an ESD prevention wrist strap on your wrist and connect to the SX6512 series chassis.

### 6.5.1 Extracting a Management Module

Management modules are located on the leaf side, above the leafs. There are two places to install the management modules.



Only one management module is required to run the switch system.

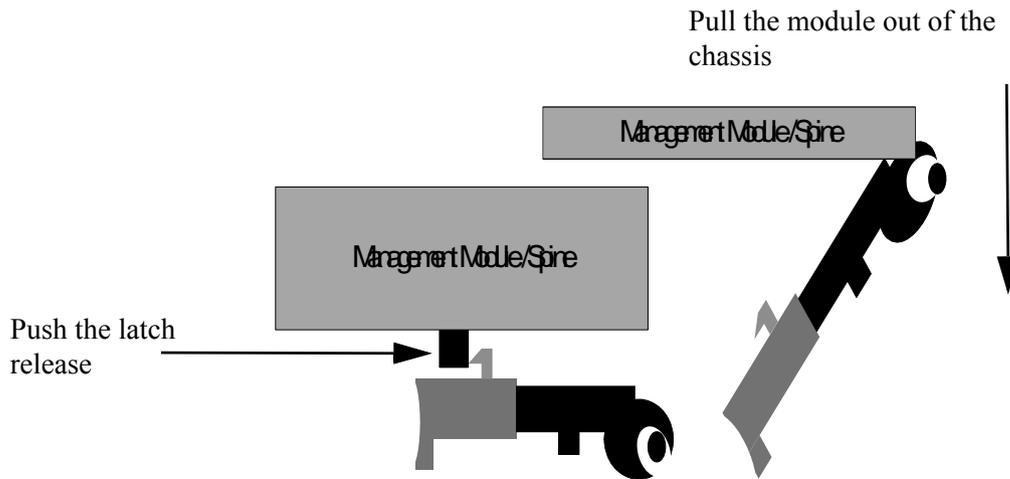
Each management module has a pair of ejectors that lock the board in place and serve as a lever for seating or extracting (see Figure 48).

1. Shut down the management module you want to replace using the following command:

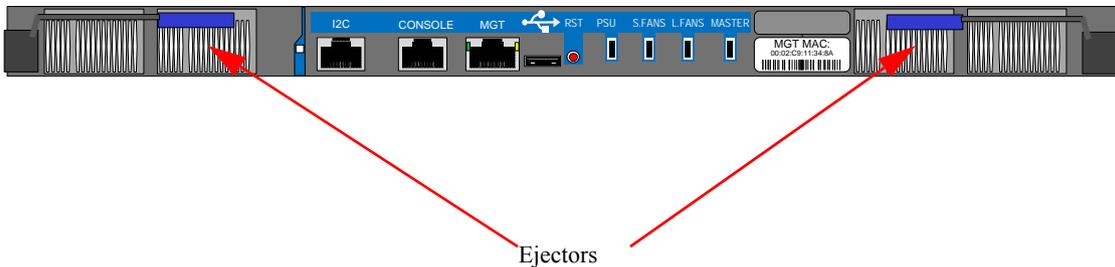
```
no power enable <module>

switch-1 [Orca648: master] (config) # no power enable MGMT2
```

2. Disconnect all cables connected to the management module.
3. Push outward on the latches to unlock the ejectors from the chassis.
4. Open the ejectors until they are 90 degrees from the module.
5. Pull out on the module using both ejectors.

**Figure 47: Ejector Latch**

The board is short, therefore do not let go of it while sliding it out.

**Figure 48: Management Module**

## 6.5.2 Inserting a Management Module

1. Start with the latch fully open, that is perpendicular to the front panel of the leaf.
2. Carefully seat the management module into the slot and slowly slide the board into the chassis until the ejectors begin to engage on the chassis edge.
3. Press the ejectors inward until the locks snap. This indicates that the board is fully seated.



On switch systems with dual management systems, first connect the cable and configure the master management module CPU and only then configure the slave. By default the master CPU is the top management module. For further information on the master and slave roles, see the MLNX-OS Software UM section “High Availability” for more information.

Initial configuration must be done on all of the management modules. See the Installation Guide for the Initial Configuration procedure.



All management modules in the chassis must go through an initial configuration procedure. See the Installation Guide for the initial configuration procedure.

## 6.6 Switch Shut Down Procedures

### 6.6.1 To shut down the chassis run the following command twice (once for each MM):

```
Reload halt [noconfirm]
```



#### **The chassis cannot be restarted remotely!**

To restart the chassis you must physically go to the switch and unplug all of the power cords to the chassis and then replug in all of the power cords to the chassis.

The first time you run the command it shuts down the master management module and the second time shuts down the slave management module.

### 6.6.2 To shut down a leaf run the following command:

```
no power enable <module>
```

### 6.6.3 To shut down a spine run the following command:

```
no power enable <module>
```

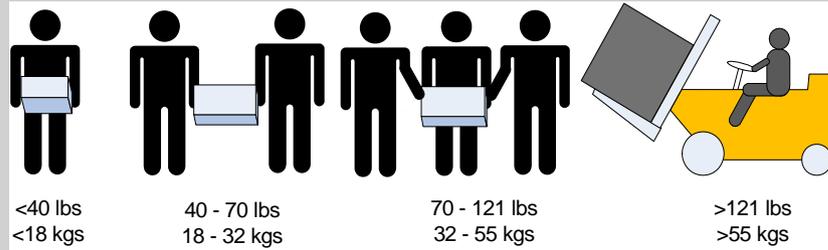
## 7 Disassembly and Disposal

### 7.1 Disassembling the Chassis

1. Power down the chassis.
2. Remove all power cables.
3. Remove all connector cables.
4. Disconnect the ground lug from the ground post.
5. Remove all leafs.
6. Remove all spines.
7. Remove all management modules.



Use enough people to safely lift this product.



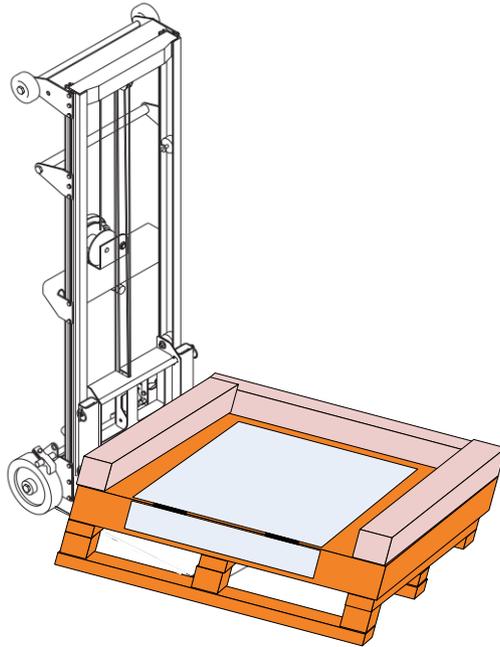
This product and all of its parts are NOT to be disposed of with household waste. This product contains printed circuit boards cables and batteries. According to the WEEE Directive 2002/96/EC, all waste electrical and electronic equipment (EEE) should be collected separately and disposed of according to the directive.

8. Dispose of these pieces in a legal and environmentally friendly way.

#### 7.1.1 Removing the Chassis

1. Remove the screws connecting the upper brackets to the rack.
2. Remove the screws holding the chassis to the rack. These screws are located in the faceplate on the spine side of the chassis.
3. Remove the upper brackets from the chassis.

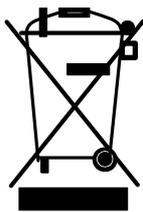
4. Dispose of the Chassis in a legal and environmental way.



### 7.1.2 Removing the Bottom Shelf

1. Remove all of the bolts that are holding the shelf to the rack.
2. Remove the shelf.
3. Remove all of the caged nuts.

## 7.2 Disposal



According to the WEEE Directive 2002/96/EC, all waste electrical and electronic equipment (EEE) should be collected separately and not disposed of with regular household waste.

Dispose of this product and all of its parts in a responsible and environmentally friendly way.

## 8 Switch Management Tools

This chapter describes the management module and tools available for Out-of-Band management of the switch system via MLNX-OS.



There are 2 Ethernet ports (1 for each management module) that get connected to Ethernet switches. These switches must be configured to 10/100M auto-negotiation.

The SX6512 switch comes standard with a management software module for chassis management called Mellanox Operating System (MLNX-OS). MLNX-OS is installed on all SwitchX based managed switch systems. MLNX-OS includes a CLI, WebUI, SNMP, and chassis management features for software and IB management software (OpenSM).

The IB Subnet Manager running on the switches supports up to 648 nodes. If the fabric includes more than 648 nodes, you may need to purchase Mellanox's Unified Fabric Manager™ (UFM™) software package.

The managed switch system includes the following software components:

- Embedded OS
- Chassis manager and system BIST
- SNMP agent, 3rd party tool integration
- GUI
- Subnet Manager (SM)
- Remote logging
- SSH/telnet
- Secured access in-band and out-band
- IPv4/IPv6 network stack

The chassis manager will give the user access to:

- Switch temperatures
- Power supply voltages
- Fan unit information
- Power unit information
- Flash memory
- Monitoring of:
  - AC power to the PSUs
  - DC power out from the PSUs
  - chassis failures
- querying for:
  - switch serial numbers

- revisions
- software version
- SwitchX FW version
- switch temperatures

The manager also has the ability to burn new firmware and upgrade software on the switch.

## 8.1 InfiniBand Subnet Manager

The InfiniBand Subnet Manager (SM) is a centralized entity running in the switch. It discovers and configures all the InfiniBand fabric devices to enable traffic flow between those devices. The SM applies network traffic related configurations such as QoS, routing, partitioning to the fabric devices.

You can view and configure the Subnet Parameters (SM) via the CLI/WebUI.

Each InfiniBand subnet needs one subnet manager to discover, activate and manage the subnet. An InfiniBand® network requires a Subnet Manager to be running in either the Infiniband switch itself (switch based) or on one of the nodes which is connected to the Infiniband fabric (host based).

## 8.2 Fabric Diagnostics with UFM Diag

UFM Diag is a plug & play software for free within MLNX-OS displaying and filtering all identified systems and nodes within the fabric.

UFM Diag includes a complete set of tools for fabric wide diagnostics to check node-node and node-switch connectivity and to verify routes within the fabric.

Advanced filtering allows creating filtering rules on a system wide basis, between nodes or port connections based on traffic patterns and user assigned system names (GUIDs).

## 8.3 Accessing the CPU via the Ethernet Connector

Once the initial configuration is completed the management tools can be accessed through:

- SSH
- Telnet
- WEB
- SNMP
- XML

## 8.4 Upgrading Software

The new software and firmware update is available to the user from the Mellanox Support website. Copy the update to a known location on a Remote server within your LAN.

Use the CLI or the GUI in order to perform the Software upgrade. For further information please refer to the MLNX-OS user manual.



If MLNX-OS is updated and the FW image in the leafs and spines of the chassis is an earlier version than the minimum that the new version of the software can work with, then the chassis management system may require up to ~45 minutes to update all of the FW images in all of the leafs and spines.

## 9 Troubleshooting

As each PSU is plugged in, make sure that the green power LEDs on the PSU come on.

### 9.1 Power Supply Unit



If the Power supplies cannot supply enough power the management module may shut down the system.

#### If the AC power LED is off:

1. Check that the power cable is the correct power cable for your country.
2. Check that the power cable is plugged into a working outlet.
3. Check that the power cable has a voltage within the range of 100 - 240 volts AC.
4. Remove and reinstall the power cable.
5. Check the circuit breakers to be sure that the breaker has not tripped.
6. Check that the power cable is good. Replace the power cable.
7. If the AC power LED is green but the OK power LED is off or the FAIL LED is on – Replace the PSU.

### 9.2 Leaf Board

#### The power LED for the Leaf board is off:

1. Make sure that all of the PSUs are showing DC OK.
2. Uninstall and reinstall the Leaf board.
3. When the Yellow LED is on, this indicates a fault in the board, uninstall and reinstall the Leaf board.
4. If uninstalling and reinstalling the Leaf board does not work, burn the latest FW on the Leaf board and uninstall and reinstall the Leaf board.
5. Replace the Leaf board with a new one.



Should any of the boards shut down due to over temperature, wait 5 minutes and then follow the procedure starting with Step 2.

#### The Physical link LED for the InfiniBand connector does not come on:

1. Check that both ends of the cable are connected.
2. Check that the locks on the ends are secured.
3. Make sure that the latest FW version is installed on both the HCA card and the switch.
4. If media adapters are used check that the all connections are good, tight, and secure.
5. Replace the cable.

**The Activity indication does not come on:**

Check that the Subnet Manager has been started.

## 9.3 Management Module

### 9.3.1 Yellow Status LED (for the Chassis) on the Management Module is Lit

1. Reset the master management module by pushing the rest button. If you have two management modules installed this will convert the master management module to the slave and convert the slave to the master.
2. Make sure the S.Fans and L.Fans LEDs are green.
3. Make sure that the spine and the leafs both have the same version of FW.
4. Reburn the FW and remove and reinstall the management module.
5. If you are running the chassis with only one management module, remove and reinstall the management module. Make sure the mating connectors of the unit are free of any dirt and/or obstacles. See Section 6.5 on page 63.
6. If you are running the chassis with only one management module, replace the management module.

### 9.3.2 Yellow LED for the Leaf Fan on the Management Module is Lit

1. Make sure that there is nothing blocking the front or rear of the chassis and that the fan modules and ventilation holes are not blocked (especially dust over the holes).
2. If you find dust blocking the holes it is recommended to clean the fan unit and remove the dust from the front and rear panels of the switch using a vacuum cleaner.
3. Determine which fan module is problematic by checking the status LED on each fan module.
4. Remove and reinstall the problematic fan unit. Make sure the mating connector of the new unit is free of any dirt and/or obstacles. See Section 6.4 on page 60.
5. Replace the Leaf fan module.



Replace defective leaf fan modules as soon as they are identified.



Should any of the boards shut down due to over temperature, follow the procedure starting in Step 1.

### 9.3.3 Yellow LED for the Spine Fan on the Management Module is Lit

1. Determine which spine has a defective fan by checking the Fan LEDs on all of the spines.
2. Make sure that there is nothing blocking the front or rear of the chassis and that the fan modules and ventilation holes are not blocked (especially dust over the holes).
3. If you find dust blocking the holes it is recommended to clean the fan unit and remove the dust from the front and rear panels of the switch using a vacuum cleaner.

4. Remove and reinstall the fan unit of the spine. Make sure the mating connector of the new unit is free of any dirt and/or obstacles. See Section 6.4 on page 60.
5. Replace the spine fan module.



Replace defective spine fan modules as soon as they are identified.

## 9.4 Spine Board

**The yellow LED on the Spine board is lit:**

1. Make sure that there is nothing blocking the front or rear of the chassis and that the fan modules and ventilation holes are not blocked (especially dust over the holes).
2. If you find dust blocking the holes it is recommended to clean the fan unit and remove the dust from the front and rear panels of the switch using a vacuum cleaner.
3. Remove and reinstall the spine board. Make sure the mating connectors of the unit is free of any dirt and/or obstacles. See Section 6.3 on page 59.
4. Make sure that the spine and the Leafs both have the same version of FW.
5. Return the FW and remove and reinstall the spine.
6. Replace the spine board.

## 9.5 MLNX-OS SW

**The last software update did not succeed:**

1. Connect the RS232 connector (CONSOLE) to a laptop.
2. Push the reset button on the switch or management module.
3. You will have ~ 5 seconds to stop the U-Boot by pressing Control-B.
4. Choose the image to upload. Only use image 1 or image 2.

```

U-Boot 2009.01-mlnx1.4 (May 12 2010 - 14:08:15)

CPU: AMCC PowerPC 460EX Rev. A at 1000 MHz (PLB=200, OPB=100,
      EBC=100 MHz)

Security/Kasumi support

Bootstrap Option H - Boot ROM Location I2C (Addr 0x52)

Internal PCI arbiter disabled

32 kB I-Cache 32 kB D-Cache

Board: Mellanox PPC460EX Board

FDEF: No

```

```
I2C:   ready

DRAM:   2 GB (ECC enabled, 400 MHz, CL3)

FLASH: 16 MB

NAND:   1024 MiB

PCI:    Bus Dev VenId DevId Class Int

PCIE0: link is not up.

PCIE1: successfully set as root-complex

       01 00 15b3 bd34 0c06 00

Net:    ppc_4xx_eth0, ppc_4xx_eth1

Hit Ctrl+B to stop autoboot:  0

Mellanox FabricIT

Boot Menu:

  1. EFM_PPC_M460EX EFM_1.1.1000 2010-06-24 16:32:03 ppc
  2. EFM_PPC_M460EX EFM_1.1.1200 2010-06-25 18 :00:03 ppc
  3. U-Boot prompt

Choice:
```

5. Select the image to boot.

# Appendix A: Specification Data

## A.1 Specifications

**Table 14 - Switch Specification Sheet SX6512**

Physical		Power and Environmental	
H x W x D:	15.75" x 19" x 27" inches 400 mm x 482.6mm x 733 mm The shelf adds 44.5mm to the height	Input Voltage:	90-264 VAC, 50-60Hz, 13A@100V 6.3A@240V
Weight:	120 kg full configuration 265 lbs. full configuration 48 kg (105 lbs) empty configuration	Temperature:	10 to 45 Celsius
Mounting:	19" Rack mount (EIA-310)	Max Heat Output:	9,600 BTUs/hr verify
Max. Air Flow Through leaves:	16.59M3/min. (585.9 CFM)	Humidity:	10% - 90% non-condensing
Max. Air Flow Through spines:	9.48 M3/min. (334.8 CFM)	Power Consumption Leaf:	Typical 82.28W (not including QSFP power) Max 89.74W (not including QSFP power)
SerDes Speeds:	20 and 40 Gb/s per port	Power Consumption Spine:	Typical 102.86W (include 2 Fans) Max110.32W (include 2 Fans)
Connector Types:	QSFP	Power Consumption for Active cables QSFP:	2.0W Power level #2
Center of Gravity		<b>SX6512</b>	216 ports
CoGh :	173.5 (mm from bottom of chassis)	Power Consumption:	Typical: 2553.59W (including QSFP at 2W) Typical: 2337.59W (including QSFP at 1W) Max: 2815.11W (including QSFP at 2W)
CoGw:	222 (mm from left side surface)		
CoGd :	323.9 (mm from port end surface) Measured from the bottom left corner as one faces the switch ports.		
Max Heat Output:			

**Table 14 - Switch Specification Sheet SX6512**

Protocol Support		Regulatory Compliance	
InfiniBand: QoS: Management:	Auto-Negotiation of (20Gb/s, 40Gb/s) 8 InfiniBand Virtual Lanes for all ports Baseboard, Performance, and Device management Agents for full InfiniBand In-Band Management	Safety:	US/Canada: cTUVus EU: IEC60950 International: CB  USA: FCC, Class A Canada: ICES, Class A  EMC: EU: EN55022, Class A EU: EN55024, Class A EU: EN61000-3-2, Class A EU: EN61000-3-3, Class A Japan: VCCI, Class A  ENVIRONMENTAL: EU: IEC 60068-2-64: Random Vibration EU: IEC 60068-2-29: Shocks, Type I / II EU: IEC 60068-2-32: Fall Test  ACOUSTIC: ISO 7779 ETS 300 753  SOUND POWER LEVEL: 76 db(A)
Scalability and Performance		Replaceable Parts	
Switching Performance:  Addressing:  Switching Capacity	Simultaneous wire-speed any port to any port 48K Unicast Addresses Max. per Subnet 16K Multicast Addresses per Subnet  17.3Tb/s	Leafs  Power Supplies  Leaf Fan Modules  Spine Fan Modules  Spines  Management Modules	12 leafs; 18-ports each  4 Power Supplies one of which is redundant  4 Leaf Fan Modules  6 Spine Fan Modules (1 in each spine) with 2 integral fans per module  6  2 available 1 required for oper- ation

## A.2 EMC Certifications

The list of approved certifications per chassis in different regions of the world is located on the Mellanox Website at:

[www.mellanox.com/related-docs/user\\_manuals/Regulatory\\_and\\_Compliance\\_Guide.pdf](http://www.mellanox.com/related-docs/user_manuals/Regulatory_and_Compliance_Guide.pdf)

EMC Statements are also in the Regulatory and Compliance Guide.

## Appendix B: Calculating the Weight of a Customized Chassis

The weight of a customized chassis can be calculated for any possible customization as follows.

Take the weight of a chassis with:

- all fans modules
- all power supplies

The weight of the SX65126518 chassis configured above is 83.94kg.

To this add:

$(\# \text{ of spines} * 3.73) + (\# \text{ of leafs} * 2.67) + ((\# \text{ of leaf blanks}) * 0.764) + 3.15$  (if you will have two management modules) + 1.15 (if you will have only one management module) = weight of the chassis plus the leaf boards, spines, PSUs, and Management modules installed in the chassis.

## Appendix C: Calculating the Power of a Customized Chassis

To calculate the power consumption of a customized chassis take the base power and add the power of the fans, spines, management modules, and leafs.

**Table 15 - Power Consumption of Chassis Parts**

Part	typ power passive cables	typ power active cables @ 2W per port
IB FDR leaf	91W	125
Spine	108W	Not applicable
Fan	15W	Not applicable
Management Module	14W	Not applicable

To calculate the chassis power:

$((108W * \# \text{ of spines}) + (14W * \# \text{ of management modules}) + (14W * \# \text{ of fans}) + (91W * \# \text{ of leafs for passive cables}) \text{ or } (125W * \# \text{ of leafs for active cables})) / 0.85$  Where 0.85 is the power supply efficiency.

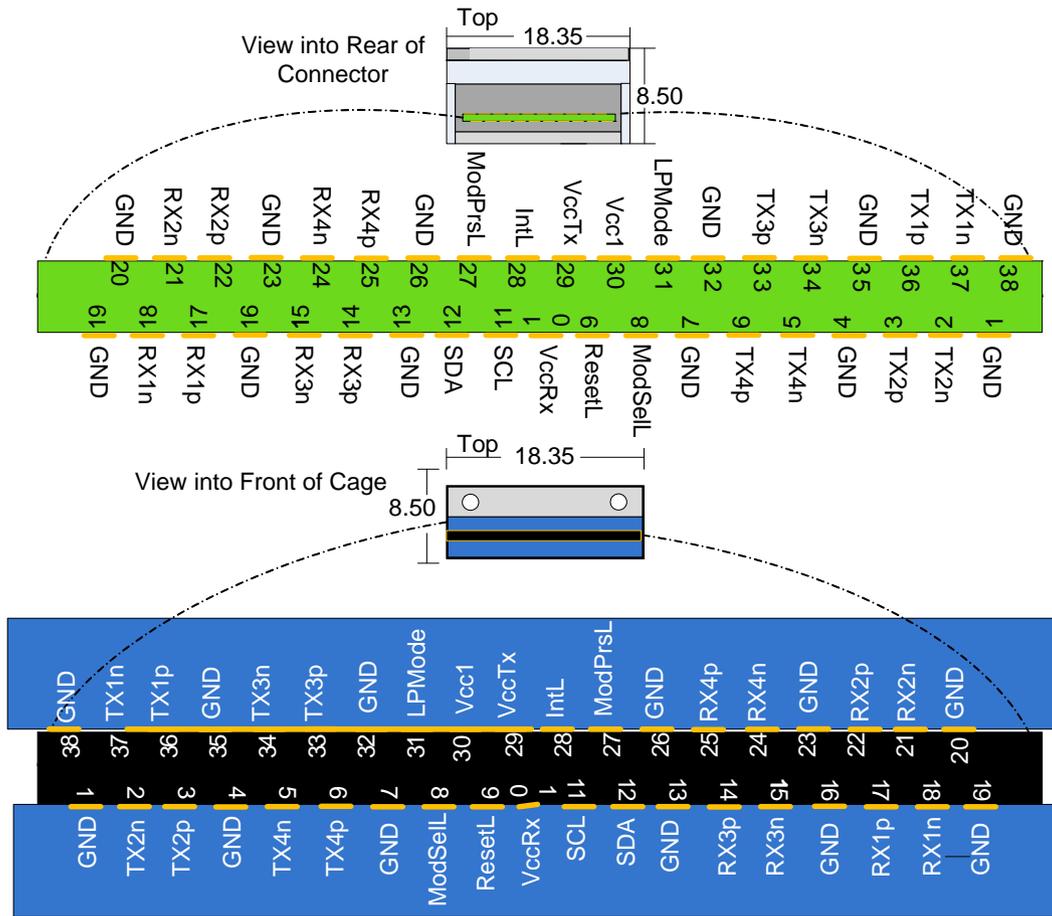
## Appendix D: QSFP Interface

20	GND	GND	19
21	Rx2n	Rx1n	18
22	Rx2p	Rx1p	17
23	GND	GND	16
24	Rx4n	Rx3n	15
25	Rx4p	Rx3p	14
26	GND	GND	13
27	ModPrsL	SDA	12
28	IntL	SCL	11
29	VccTx	Vcc Rx	10
30	Vcc1	ResetL	9
31	LPMODE	ModSelL	8
32	GND	GND	7
33	Tx3p	Tx4p	6
34	Tx3n	Tx4n	5
35	GND	GND	4
36	Tx1p	Tx2p	3
37	Tx1n	Tx2n	2
38	GND	GND	1

**Table 16 - InfiniBand QSFP Connector Pinout**

Connector Pin Number	Connector Pin Name	Signal Description
1	GND	Ground
2	Tx2n	Transmitter Inverted Data Input
3	Tx2p	Transmitter Non-Inverted Data Input
4	GND	Ground
5	Tx4n	Transmitter Inverted Data Input
6	Tx4p	Transmitter Non-Inverted Data Input
7	GND	Ground
8	ModSelL	Module Select
9	ResetL	Module Reset
10	Vcc Rx	+3.3 V Power supply receiver
11	SCL	2-wire serial interface clock
12	SDA	2-wire serial interface data
13	GND	Ground
14	Rx3p	Receiver Non-Inverted Data Output
15	Rx3n	Receiver Inverted Data Output
16	GND	Ground
17	Rx1p	Receiver Non-Inverted Data Output
18	Rx1n	Receiver Inverted Data Output
19	GND	Ground
20	GND	Ground
21	Rx2n	Receiver Inverted Data Output 3
22	Rx2p	Receiver Non-Inverted Data Output 3
23	GND	Ground
24	Rx4n	Receiver Inverted Data Output 3
25	Rx4p	Receiver Non-Inverted Data Output 3
26	GND	Ground
27	ModPrsL	Module Present
28	IntL	Interrupt
29	Vcc Tx	+3.3 V Power supply transmitter
30	Vcc 1	+3.3 V Power Supply
31	LPMODE	Low Power Mode
32	GND	Ground
33	Tx3p	Transmitter Non-Inverted Data Input
34	Tx3n	Transmitter Inverted Data Input
35	GND	Ground
36	Tx1p	Transmitter Non-Inverted Data Input
37	Tx1n	Transmitter Inverted Data Input
38	GND	Ground

**Figure 49: QSFP Connector Male and Female Views**



## Appendix E: Replacement Parts Ordering Numbers

**Table 17 - Replacement Parts Ordering Numbers**

Part Description	OPN
Power supply unit PSU	MTP005001
Power supply blank	MTM005001
Leaf board unit 18 port QDR	MSX6001QR
Leaf board unit 18 port FDR	MSX6001FR
Leaf board unit 18 port FDR-10	MSX6001TR
Modular Switch Family, Leaf - Blank	MTM005004
Spine board unit for FDR system	MSX6002FLR
Spine board unit for FDR10/QDR system	MSX6002TBR
Spine board blank	MTM005002
PPC460 Management Module	MSX6000MAR
x86 Management Module	MSX6000MBR
Modular Switch Family, Management - Blank	MTM005003
Rack Installation Kit for IS5600/SX6536 Series	MTR005600
Cable Management Device Set for IS5600/SX6536	MTR005601
Cables Set For IS5600/SX6536 Series	MTR005602
IS5600/SX6536, IS5300/SX6518 Series Modular Switch, leaf cooling chassis fan unit located on Leaf Side	MTF005001
IS5600/SX6536, IS5300/SX6518 Modular Switch, leaf cooling chassis fan unit located on Spine Side	MTF005002
IS5600/SX6536, IS5300/SX6518 Modular Switch Series Spine Fan Unit	MTF005005
Fan unit for spines	MTF005003
DB9 to RJ45 Harness	HAR000028
Power cord 250V 15A 2.0M C14 to C13	ACC000334
Power cord 125V 15A 2.0M C14 TO C13	ACC000242
Power cord Type B for USA, Canada, Mexico, Taiwan	ACC000204
Power cord Type H for Israel	ACC000205

<b>Part Description</b>	<b>OPN</b>
Power cord Type E/F for Sweden, France, Germany, Netherlands, Russia	ACC000207
Power cord Type G for UK	ACC000208
Power cord Type D for India	ACC000209
Power cord Type I for China	ACC000210
Power cord Type J for Switzerland	ACC000211
Power cord Type B for Japan	ACC000212
Power cord Type I for Australia	ACC000213

# Appendix F: Avertissements de sécurité d'installation (French)

## 1. Instructions d'installation



Lisez toutes les instructions d'installation avant de brancher le matériel à la source d'alimentation électrique.

## 2. Température excessive



Ce matériel ne doit pas fonctionner dans une zone avec une température ambiante dépassant le maximum recommandé de 45°C (113°F). Un flux d'air de 200LFM à cette température ambiante maximale est nécessaire. En outre, pour garantir un bon écoulement de l'air, laissez au moins 8 cm (3 pouces) d'espace libre autour des ouvertures de ventilation.

## 3. Empilage du châssis



Le châssis ne doit pas être empilé sur un autre matériel. Si le châssis tombe, il peut provoquer des blessures corporelles et des dégradations de biens.

## 4. Connexion d'Alimentation électrique excédentaire -dangers électriques



Ce produit comporte un couvercle transparent sur l'espace pour l'alimentation électrique redondante.  
Ne pas faire fonctionner le produit si le couvercle transparent n'est pas solidement fixé ou s'il est enlevé.

## 5. Orages – dangers électriques



Pendant un orage, il ne faut pas utiliser le matériel et il ne faut pas brancher ou débrancher les câbles.

## 6. Branchement/débranchement des câbles InfiniBand en cuivre



Les câbles InfiniBand en cuivre sont lourds et ne sont pas flexibles, il faut donc faire très attention en les branchant et en les débranchant des connecteurs. Consultez le fabricant des câbles pour connaître les mises en garde et les instructions spéciales.

## 7. Montage et entretien sur baie



Lorsque ce produit est monté ou entretenu sur baie, il faut prendre des précautions spéciales pour s'assurer que le système reste stable. En général, il faut remplir la baie avec du matériel de bas en haut.

**8. Fuite > 3.5mA Leakage > 3.5mA**

« ATTENTION – La connexion à la terre des forts courants de fuite est essentielle avant le branchement de l'alimentation. »

Avant de brancher l'appareil à la conduite d'alimentation, les vis de protection à la terre du terminal de l'appareil doivent être appliquées à l'installation de protection à la Terre du bâtiment.

**9. Forts Courants de Fuite High Leakage Current**

Attention: Forts courants de fuite. Il est essentiel de relier à la terre avant de brancher l'alimentation.

**10. Ajouter une information de connexion à la masse Connect a Valid Ground to this Device**

Avant de brancher l'appareil à la conduite d'alimentation, les vis de protection à la terre du terminal de l'appareil doivent être appliquées à l'installation de protection à la Terre du bâtiment.

**11. Installation du matériel**

Ce matériel ne doit être installé, remplacé ou entretenu que par du personnel formé et qualifié.

**12. Elimination du matériel**

L'élimination de ce matériel doit s'effectuer dans le respect de toutes les législations et réglementations nationales en vigueur.

**13. Codes électriques locaux et nationaux**

Ce matériel doit être installé dans le respect des codes électriques locaux et nationaux.

**14. Codes d'installation**

L'appareil doit être installé selon l'ancienne version des codes électriques nationaux du pays. Pour l'Amérique du Nord, l'équipement doit être installé conformément aux spécifications du Code Electrique National Américain et du Code Electrique Canadien.

**15. Interconnexion des unités**

Les câbles de branchement à l'unité RS232 et les interfaces Ethernet doivent être certifiés UL de type DP-1 ou DP-2. (Note - lorsqu'il existe dans un circuit non LPS)

Protection contre la surintensité : Un appareil de protection répertorié facilement accessible contre la surintensité du circuit de branchement et calibré à 20A doit être incorporé dans le câblage électrique du bâtiment.

## 16. Exposition au rayonnement grave



Mise en garde – l'utilisation de commandes ou de réglages ou l'exécution de procédures autres que ce qui est spécifié dans les présentes peut engendrer une exposition au rayonnement grave.



PRODUIT LASER DE CLASSE 1 » et références aux normes laser les plus récentes CEI 60 825-1:1993 + A1:1997 + A2:2001 et NE 60825-1:1994+A1:1996+ A2:2001

## 17. S'assurer que les enceintes sont appropriées



Des enceintes électriques, mécaniques et incendie adaptées doivent être fournies par le fabricant du produit final ou par l'utilisateur final.

## 18. Cordons électriques CA homologués UL



Pour les prises électriques en Amérique du Nord, choisissez un cordon électrique homologué UL et certifié CSA

à 3 conducteurs, [18 AWG], terminé par une fiche moulée, d'une tension nominale de 125 V, [15 A], avec une longueur minimale de 1,5 m [6 pieds] et d'une longueur maximale de 4,5 m [18 pieds]

Pour les prises électriques en Europe, choisissez un cordon électrique harmonisé internationalement et marqué "<HAR>",

à 3 conducteurs, d'un diamètre de fil minimum de 0,75 mm<sup>2</sup>, d'une tension nominale de 300 V, avec une gaine isolée en PVC. Le cordon doit avoir une fiche moulée d'une tension nominale de 250 V et d'une intensité nominale de 10 A.

## Anhang G: Installation - Sicherheitshinweise (German)

### 1. Installationsanleitungen



Lesen Sie alle Installationsanleitungen, bevor Sie das Gerät an die Stromversorgung anschließen.

### 2. Übertemperatur



Dieses Gerät sollte nicht in einem Bereich mit einer Umgebungstemperatur über der maximal empfohlenen Temperatur von 45°C (113°F) betrieben werden. Es ist ein Luftstrom von 200 LFM bei maximaler Umgebungstemperatur erforderlich. Außerdem sollten mindestens 8 cm (3 in.) Freiraum um die Belüftungsöffnungen sein, um einen einwandfreien Luftstrom zu gewährleisten.

### 3. Stapeln des Chassis



Das Chassis sollte nicht auf andere Geräte gestapelt werden. Wenn das Chassis herunterfällt, kann es zu Verletzungen und Beschädigungen an Geräten führen.

### 4. Redundanter Stromversorgungsanschluss - Elektrische Gefahr



Dieses Produkt verfügt über eine Abdeckung über dem Bereich für die redundante Stromversorgung. Betreiben Sie das Produkt nicht, wenn diese Abdeckung nicht sicher fest sitzt oder entfernt wurde.

### 5. Bei Gewitter - Elektrische Gefahr



Arbeiten Sie während eines Gewitters und Blitzschlag nicht am Gerät, schließen Sie keine Kabel an oder ab.

### 6. Anschließen/Trennen von InfiniBand-Kupferkabel



InfiniBand-Kupferkabel sind schwer und nicht flexible. Deshalb müssen sie vorsichtig an die Anschlüsse angebracht bzw. davon getrennt werden. Lesen Sie die speziellen Warnungen und Anleitungen des Kabelherstellers.

### 7. Rack-Montage und Wartung



Wenn dieses Produkt in einem Rack montiert oder gewartet wird, sind besondere Vorsichtsmaßnahmen zu ergreifen, um die Stabilität des Systems zu gewährleisten. Im Allgemeinen sollten Sie das Gestell von unten nach oben mit Geräten füllen.

### 8. Geräteinstallation



Diese Gerät sollte nur von geschultem und qualifiziertem Personal installiert, ausgetauscht oder gewartet werden.

## 9. Geräteentsorgung



Die Entsorgung dieses Geräts sollte unter Beachtung aller nationalen Gesetze Bestimmungen erfolgen.

## 10. Regionale und nationale elektrische Bestimmungen



Dieses Gerät sollte unter Beachtung der regionalen und nationalen elektrischen Bestimmungen installiert werden.

## 11. Richtigen Schutz sicherstellen



Geeigneter elektrischer, mechanischer und Feuerschutz sind vom Hersteller des Endprodukts oder dem Endbenutzer bereitzustellen.

## 12. Strahlenkontakt



Achtung – Nutzung von Steuerungen oder Einstellungen oder Ausführung von Prozeduren, die hier nicht spezifiziert sind, kann zu gefährlichem Strahlenkontakt führen..



Klasse 1 Laserprodukt und Referenzen zu den aktuellsten Lasterstandards :  
ICE 60 825-1:1993 + A1:1997 + A2:2001 und EN 60825-1:1994+A1:1996+ A2:2001

## 13. UL-und CSA Certified Netzkabel UL Listed and CSA Certified Power Supply Cord



Für Nordamerika Stromanschluss, wählen Sie ein Netzkabel, das UL-und CSA Certified

3 - Leiter, [18 AWG], mit einem angespritztem Stecker bewertet bei 125 V, [15], mit einer Mindestlänge von 1,5 m [Six Feet] aber nicht mehr als 4,5 m.

Für die europäischen Zusammenhang, wählen Sie ein Netzkabel, das international harmonisiert und der Aufschrift "<HAR>",

3 - Leiter, mindestens 0,75 mm<sup>2</sup> Draht, bewertet mit 300 V, mit einem PVC-Mantel isoliert. Das Kabel muss eine angespritztem Stecker bewertet bei 250 V, 10 A. "

## 14. Ableitstrom > 3.5mA LEAKAGE >3.5mA



WARNUNG: Hohe Ableitstrom; Earth Verbindung, bevor Sie die Verbindung von wesentlicher Bedeutung werden.

### 15. Add GND Verbindung Informationen Add GND connection information



Bevor Sie dieses Gerät an das Stromnetz, die Schutz Erde Terminal Schrauben dieses Gerät muss an den Schutzleiter in der Gebäudeinstallation.

### 16. INSTALLATION CODES INSTALLATION CODES



Dieses Gerät muss installiert sein, entsprechend auf die neueste Version des Landes National Electrical Code. Für Nordamerika, müssen in Übereinstimmung mit den geltenden Vorschriften in der US-amerikanischen National Electrical Code und dem Canadian Electrical Code.

### 17. Zusammenschaltung von EINHEITEN INTERCONNECTION OF UNITS



Kabel für den Anschluss an das Gerät RS232- und Ethernet-Schnittstellen müssen UL zertifiziert Typ DP-1 oder DP-2. (Hinweis-, wenn nicht mit Wohnsitz in LPS-Schaltung)

Überstromschutz: Eine leicht zugängliche Auflistung Abzwegleitung Überstrom-Schutzeinrichtung 20 A bewertet werden müssen in dem Gebäude Verkabelung.

# Appendix H: Advertencias de seguridad para la instalación (Spanish)

## 1. Instrucciones de instalación



Antes de conectar el equipo a la fuente de alimentación, leer todas las instrucciones de instalación.

## 2. Lesión corporal por peso



Dado que el equipo es muy pesado, se debe mover únicamente mediante un elevador mecánico, para evitar lesiones.

## 3. Instalación en un lugar con acceso restringido.



Esta unidad ha sido ideada para instalar en lugares de acceso restringido.

## 4. Sobrecalentamiento



No se debe utilizar el equipo en un área con una temperatura ambiente superior a la máxima recomendada: 45°C (113°F). Además, para garantizar una circulación de aire adecuada, se debe dejar como mínimo un espacio de 8 cm (3 pulgadas) alrededor de las aberturas de ventilación.

## 5. Apilamiento del chasis



Los chasis no se deben apilar sobre otros equipos. La caída del chasis podría causar lesiones corporales, así como daños al equipo.

## 6. Conexión de fuente de alimentación redundante: peligro de descarga eléctrica



Este producto incluye una fuente de alimentación redundante o, en su lugar, una vacía. Si se dispone de una fuente de alimentación vacía, no utilizar el producto si su tapa está quitada o no está bien cerrada.

## 7. Cuando hay rayos: peligro de descarga eléctrica



No utilizar el equipo ni conectar o desconectar cables durante períodos de actividad de rayos.

## 8. Conexión y desconexión del cable Copper InfiniBand



Dado que los cables de cobre InfiniBand son pesados y no son flexibles, su conexión a los conectores y su desconexión se deben efectuar con mucho cuidado. Para ver advertencias o instrucciones especiales, consultar al fabricante del cable.

## 9. Montaje y mantenimiento de bastidores



Al instalar o realizar el mantenimiento de este aparato en un bastidor, es preciso adoptar precauciones especiales para garantizar que el sistema se mantenga estable. En general, en un bastidor, los equipos se deben instalar comenzando desde abajo hacia arriba.

## 10. Instalación de equipos



La instalación, el reemplazo y el mantenimiento de este equipo estarán a cargo únicamente de personal capacitado y competente.

## 11. Asegurar confinamientos adecuados



El fabricante del producto final o el usuario final deberán suministrar un confinamiento adecuado para componentes eléctricos y mecánicos y contra incendio.

## 12. Eliminación de equipos



La eliminación definitiva de este equipo se debe efectuar conforme a todas las leyes y reglamentaciones nacionales.

## 13. Códigos eléctricos locales y nacionales



Este equipo se debe instalar conforme a los códigos eléctricos locales y nacionales.

## 14. Cable de alimentación homologado por UL y con certificación CSA



En conexiones de América del Norte, seleccionar un cable de alimentación homologado por UL y con certificación CSA de tres conductores, [16 AWG], terminado en un enchufe moldeado con capuchón de 125 voltios nominal, [13 A], con una longitud mínima de 1,5 metros, pero no más de 4,5 metros.

En conexiones europeas, seleccionar un cable de alimentación armonizado internacionalmente y marcado "<HAR>", de tres conductores, hilo de 1,0 mm<sup>2</sup> como mínimo, 300 voltios nominal, con cobertura protectora aislante de PVC. El cable debe tener un enchufe moldeado con capuchón de 250 voltios nominal, 10 A.

## 15. Fuga > 3,5 mA



**ADVERTENCIA:** Alta corriente de fuga. Es esencial efectuar la conexión a tierra antes de conectar la alimentación.

## 16. Añadir conexión a tierra



Antes de conectar el dispositivo a la línea de alimentación, los tornillos del terminal de la puesta a tierra de protección del dispositivo se deben conectar a la puesta a tierra de protección de la instalación del edificio.

(Información de conexión a tierra):

La instalación del edificio deberá proveer un medio para la conexión con la puesta a tierra de protección y un técnico de servicio deberá conectar permanentemente el equipo a dicho medio de conexión.

Un TÉCNICO DE SERVICIO comprobará si la toma eléctrica de la que se suministrará corriente al equipo provee una conexión con la puesta a tierra de protección del edificio. De no ser así, el TÉCNICO DE SERVICIO se encargará de instalar un CONDUCTOR DE CONEXIÓN A TIERRA DE PROTECCIÓN, del terminal de puesta a tierra de protección separado al conductor de tierra de protección del edificio. El equipo se instalará en un área donde haya conexión equipotencial, como por ejemplo, un centro de telecomunicaciones o una sala de computadoras dedicada.

## 17. Códigos de instalación



Este dispositivo se debe instalar conforme a la versión más reciente de los códigos eléctricos nacionales del país en cuestión. En América del Norte, el equipo se debe instalar de acuerdo con las disposiciones vigentes del Código Eléctrico Nacional de los EE.UU. y del Código Eléctrico de Canadá.

## 18. Interconexión de unidades



Los cables para la conexión con las interfaces RS232 y Ethernet de la unidad deben estar homologados por UL tipo DP-1 o DP-2. (Nota: cuando residen en circuito no de tipo LPS)

Protección contra sobrecargas: Al cableado del edificio se debe incorporar un dispositivo de protección contra sobrecargas de circuito derivado, de fácil acceso, con una corriente nominal de 20 A.

## 19. Exposición a niveles de radiación peligrosos

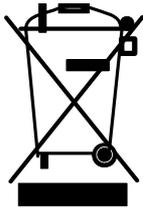


Precaución: el uso de controles o ajustes o la realización de procedimientos distintos de los que aquí se especifican podrían causar exposición a niveles de radiación peligrosos.



PRODUCTO LÁSER DE CLASE 1 y referencia a las normas de láser más recientes: IEC 60825-1:2007/03 y EN 60825-1:2007

## 20. Directiva sobre RAEE



Conforme a la Directiva 2002/96/CE sobre RAEE, todos los residuos de equipos eléctricos y electrónicos (EEE) se deben recolectar por separado y no se deben eliminar junto con residuos domésticos.

Al deshacerse de este producto y de todas sus partes, hágalo de una manera responsable y respetuosa con el medio ambiente.